Complete

BROOKLYN BOTANIC GARDEN

RECORD

VOL. VIII JANUARY, 1919 No. 1

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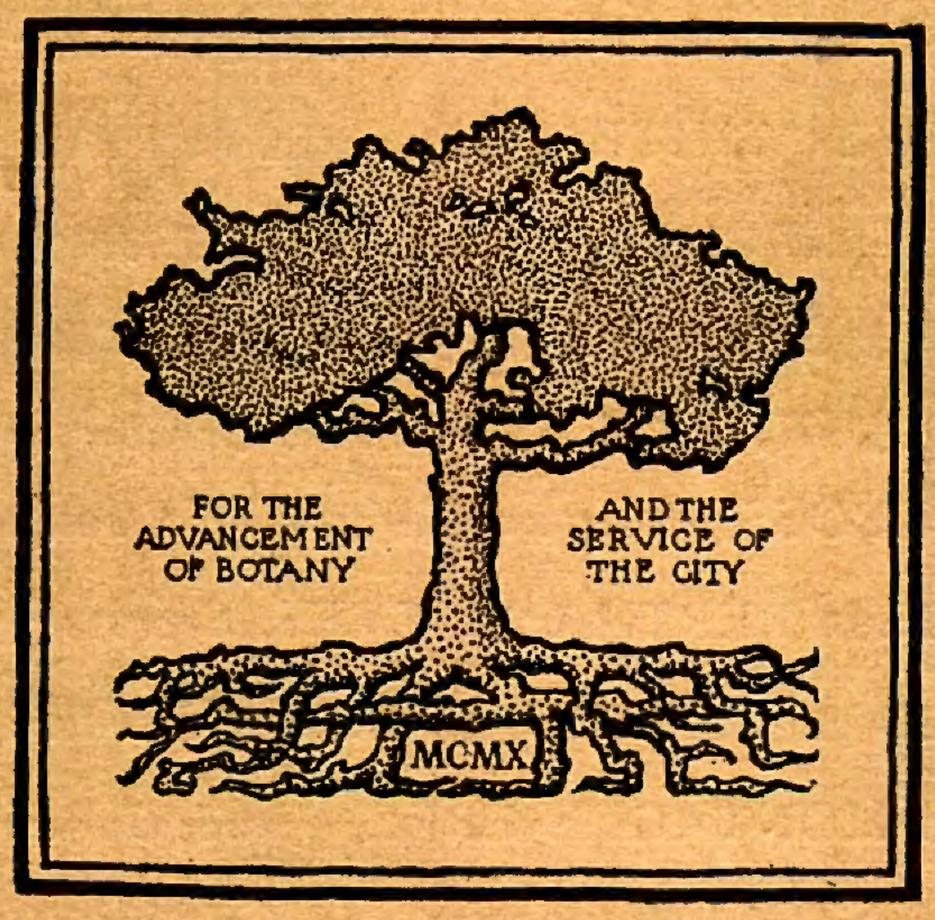
C. STUART GAGER



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THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. VIII January, 1919 NO. 1

PROSPECTUS OF COURSES OFFERED BY THE BROOKLYN BOTANIC GARDEN, 1919

A. CHILDREN'S GARDENS AND NATURE STUDY

Courses for Children

A1. The Beginner's Garden.—A course in outdoor work for boys and girls who have never had instruction in gardening. This course takes up the small garden, what to plant, how to plant it, care, replantings, etc. Open to a limited number of boys and girls. Size of plots 8 ft. by 10 ft. *Fee, twenty-five cents.* All crops belong to the individual. *Saturday* mornings 9–11, *April 19 to September 27.* Miss Shaw, Miss Blank.

A2. War Gardens.—Open to older boys and girls, or to those who have mastered Course A1. Size of plot 10 ft. by 20 ft. *Fee, fifty cents.* These gardens are for the raising of vegetables. The work is stated as a problem: "How much can one raise on a plot 10 ft. by 20 ft.?" Hours to be arranged. The student must put in at least two periods a week during the summer vacation and if possible three. Registration date: *April 12.*

Miss Shaw.

A3. Nature Study with Plants.—Planned for a better understanding of the outdoor garden. Subjects: germination, parts of a plant, relation of the plant to air, soil, water, and light. Real things are studied. The knowledge is obtained at first hand.

Each class is limited to fifteen, the ideal number for individual work. *Fee, fifteen cents,* to cover cost of material.

Boys' Spring Course.—*Saturday* mornings 9–10, *March 8 to April 12.*

Girls' Spring Course.—*Saturday* mornings 9–10, *March 8 to April 12.*

Boys' Fall Course.—*Saturday* mornings 9–10, *October 18 to December 6.*

Girls' Fall Course.—*Saturday* mornings 9–10, *October 18 to December 6.* Miss Shaw.

A4. Greenhouse Work. Plant Propagation.—How to raise plants, mix soils, transplant, start seedlings for outdoor gardens, etc. Open to a limited number of older boys and girls. *Fee, twenty cents.* Each student may take home his plants and seedlings. Courses are given each spring and fall.

Girls' Spring Course.—*Saturday* mornings 10–11, *March 8 to April 12.*

Boys' Spring Course.—*Saturday* mornings 10–11, *March 8 to April 12.*

Girls' Fall Course.—*Saturday* mornings 10–11, *October 18 to December 6.*

Boys' Fall Course.—*Saturday* mornings 10–11, *October 18 to December 6.* Miss Shaw.

A5. Advanced Nature Study.—A course designed for those older boys and girls who have taken course *A1–A4.* Plant collections will be made, and the simpler principles of classification studied. Special problems will be assigned to individuals, and larger garden plots will be set aside for the further working out of these problems. *Open only to pupil assistants of the Garden who are working for their silver pins. Hours to be arranged.*

A6. Junior Gardener's Course.—A course for boys 14–17 years of age. Lessons given in the care of border and other flower beds, in the weeding and care of small vegetable gardens, in mowing and watering lawns, repotting plants, etc. This is planned to fit boys for summer work, and to enable them to obtain positions. Hours to be arranged. *Fee, fifty cents.* Practical work with the gardeners and foreman, under the supervision of Miss Shaw.

A7. Nature Study for Boy Scouts, Camp Fire Girls and Others.—Short courses of at least four hours each, with talks, demonstrations, and field trips in the Botanic Garden and Prospect Park to study trees, shrubs, etc. The instruction will be adapted to meet the needs of the various groups who apply. *Open only to groups of at least ten persons.* Hours to be arranged.

Mr. Stoll.

A8. Special Work for High School Pupils.—A course in gardening or greenhouse work adapted for high school pupils. Classes to be arranged for by the high school teacher.

Miss Shaw.

Saturday Afternoon Lectures for Children and Adults

Stories About Plants. Illustrated by Motion Pictures

For the General Public. Admission without Ticket

April 5. Plants with Nerves; Industries of Jamaica.
April 12. Do Plants Think? The Banana Plantation.
April 19. The Birth of a Flower; Making Rope.

For children of members of the Brooklyn Botanic Garden and their friends. Admission by ticket

April 26. The Century Plant; Floating Gardens.

These talks will be given at *three o'clock* in the lecture hall. Parents are invited to accompany their children.

Courses for Teachers

A21. Greenhouse Work for Teachers.—This course is planned to be of assistance to teachers in garden work with children, and to correlate with the class work of our city schools. A study of soils, and of the plant itself. Practical work in the propagation of plants, and the raising of flower and vegetable seedlings for the outdoor garden. A *fee of one dollar* will be charged to cover cost of materials. *Tuesday* afternoons 4–5, *March 11 to April 8.*

Miss Shaw.

A22. Nature Study for Teachers.—Intended to familiarize teachers with material suitable for class use, and with easily ac-

cessible sources. The work given will be practical, such as may be applied in the nature study teaching of the class room. A *fee of fifty cents* will be charged to cover cost of material. *Mondays* 4–5, *April 7 to May 26.* Miss Shaw and assistants.

A23. Fall Garden Work.—Home plants; the school window box; indoor planting of bulbs; the outdoor bulb bed. A *fee of one dollar* will be charged to cover cost of materials. Five *Tuesday* afternoons 4–5, *October 7 to November 4.* Miss Shaw.

A24. Fall Nature Study Work.—The emphasis in this course will be placed on the common nature material and its use in the class room. A *fee of fifty cents* will be charged. *Mondays* at 4, *October 5 to November 10.* Miss Shaw and assistants.

A25. Conference in Nature Study with Plants for the Kindergarten and Primary Grades.—Three lessons at which the work laid down in the New York City Syllabus in Geography and Nature Study will be discussed, and the common material for use in such lessons will be brought in, identified, and classified. Practical work is every-day teaching. No fee. *Tuesdays* at 4, *May 13, 20 and 27.* Miss Shaw.

B I. Courses for Teachers of Children's Gardening

The course for teachers in children's garden work is planned not only to prepare for garden work, but for the teaching of nature study as well. Our courses are so arranged that they emphasize not only the theory of each subject, but its actual practice, either in classroom, greenhouse, garden, or field. At the same time the work is correlated to meet the needs of each grade of the elementary school. There is an increasing demand for good nature study work in our schools, and we make a special point of giving simple, definite, helpful work, grading it so that it applies directly to the immediate needs of our own city schools. Practice is given in all this work with classes of children of different ages. The requirements for entrance to this course are a certificate from a city training or normal school, a college diploma, or several years of successful teaching. These courses may be completed during one year, or, as in the case of city school teachers, may extend over a period of two or more years. The

fee for the entire course is twenty dollars, payable either in full at the time of registration, or ten dollars at the time of registration and ten dollars six months later. No money will be refunded if the student drops the work, and no monetary allowances will be made for courses taken at other institutions, although time allowances will be made.

Special stress is put upon the outdoor garden practice. This practice is of two kinds: (1) Practice with children. There are three hundred children in our outdoor garden and every opportunity is given for the student to become accustomed to handling children and for working out problems connected with this phase of work. (2) Practice in the teacher's garden. Each student has a garden of her own and works it herself, thus performing all gardening operations to be taught later to children.

To those who satisfactorily complete this course a certificate will be given. *The courses offered in children's gardening are considered as a unit, and are not given separately.*

B1. Soils and Agricultural Principles.—How to understand your garden: a study of soils; fertilizers, natural and chemical; relation of water and air to soil; liming; mixing of soils and tillage. Four lectures with laboratory work. *Tuesday* afternoons 4–5, *February 4–25.* Miss Shaw.

B2. Elementary Botany.—A survey of general physiological and morphological principles, illustrated by a few of the more important types of plants. Sixteen lectures and demonstrations in laboratory, greenhouse, and garden. *Mondays* at 4 p. m., *February 3 to May 19.* Dr. Olive, Dr. Gundersen.

B3. Children's Garden Practice.—The theory and practice of garden work; including such topics as planning and making the garden, laying out the grounds, preparation of soil, seed sowing, transplanting, cropping, cultivation, school garden management, improvement of school grounds, preparation of exhibits. Lectures and outdoor practice work with children in their own gardens. *Saturday* mornings 10:30–12, *March 22 to June 28.*

Miss Shaw.

B4. Plant Propagation and Greenhouse Work.—Methods of plant propagation, care of plants, cuttings, raising of seedlings for the outdoor garden. Work related to children's gardens.

Laboratory work. Six *Wednesdays,* 4–5 p. m., *March 5 to April 9.* Miss Shaw.

B5. Nature Study.—Nature in relation to gardens and plant life. Topics: plant structure; fruit and fruit formation; weeds; weed dispersal; insect pests; birds in their relation to agriculture; garden friends; shrubs; shade and lawn trees. Twenty lectures, with field work. *Tuesdays,* 4–5 p. m., *March 4 to June 3* and *September 16 to October 21.* Miss Shaw and assistants.

B6. Fungus and Insect Pests.—Four lectures and demonstrations on the occurrence of and methods of combating the commoner fungus and insect pests of garden and greenhouse plants. *Mondays* at 4 p. m., *May 26 to June 16.* Dr. Olive, Mr. Free.

B7. Fall Garden Work.—Practical work with the outdoor bulb bed, harvesting of garden crops, indoor planting of bulbs, raising plants indoors, the window box. Five lessons on *Wednesday* afternoons 4–5, *October 1–29.* Miss Shaw.

B8. Pedagogy of Botany.—A brief discussion of the mental processes involved in learning and teaching science, and the fundamental principles which underlie and point the way to laboratory and field work. Three successive *Wednesday* afternoons 4–5, *November 5–19.* Dr. Gager.

B9. Genetics.—Four lectures on the problems of heredity, variation and environment, and their bearing on education; illustrated by demonstration material obtained from plant-breeding experiments, and by lantern slides. Lecture subjects: Kinds and extent of variation in plants and animals; How characters are inherited; Sex in plants and the methods of crossing; Human heredity. *Tuesdays* 4–5, *October 28 to November 18.* Dr. White.

B10. Woodwork.—The construction of simple garden apparatus, such as window boxes, flats, sieves, tampers, dibbers, etc. *Saturdays* 10–12, *February 8 to March 15* or *October 4 to November 8.* Mr. Stoll.

B11. Practical Garden Work.—A summer's work with children in the Brooklyn Botanic Garden under supervision. The students also have their own gardens and definite garden lessons.

B II. Summer School of Children's Gardening

Courses *B1–B11* are also offered as a concentrated five weeks' summer course, from *July 7* to *August 11, 1919*. For circular and further information apply to Miss Ellen Eddy Shaw.

C. Courses for the General Public

Courses C1–C13 are *free to members of the Botanic Garden.* They are free to the general public except where otherwise specified. Those planning to take any of the above work are asked to register at the Garden at least one week before the course opens, so that adequate arrangements may be made for materials, etc. They are open to both men and women, but no course will be given to a class of less than six.

C1. House Plants and Small Conservatories.—Five lectures with demonstrations and practical work. The course includes a consideration of principles to be observed in the care of indoor plants, and cultural details concerning suitable subjects. Instruction will be given with reference to hanging baskets, window boxes, Wardian cases, etc. A *fee of $2.50* will be charged to cover cost of materials used. The plants raised by the class will become the property of those taking the course. *Thursdays* at 4, *February 6 to March 6.* Mr. Free.

C2. Garden Planning.—The object of this course is to help owners of small places to plan their yards and gardens to best advantage. No fee. *Thursdays* at 4, *March 13–27.* Mr. Free.

C3. The Outdoor Flower Garden.—Six lectures with demonstrations and practical work. Instruction will be given with regard to soils, preparation of grounds for planting, propagation, hardy perennials, annuals, vines, herbaceous borders, summer bedding, shrubbery, roses, making and care of lawns, drainage, etc. A *fee of $1.00* will be charged to cover cost of materials used. *Thursdays* at 4, *April 3 to May 8.* Mr. Free.

C4. Garden and Greenhouse Work in Fall.—A course of six lessons covering the making of cuttings, taking up and storing of plants, bulb planting, winter protection of plants, fall pruning, etc. *Thursday* afternoons 4–5, *September 25 to October 30.* A *fee of $1.00* will be charged to cover cost of materials used.

Mr. Free.

C5. Spring Flowers and Ferns.—Largely an outdoor course, with some excursions. *Fee, $1.00.* Twelve *Saturdays* at 10, *April 5 to June 21.* Dr. Gundersen.

C6. Fall Course in Trees and Shrubs.—Most of the time will be given to outdoor study in the Botanic Garden and adjacent Prospect Park. *Fee, $1.00.* Ten *Saturdays* at 10, *September 20 to November 22.* Dr. Gundersen.

C7. History of Botany.—Four illustrated lectures giving a brief outline of the history of botany from the time of the Greeks to the present. *Wednesdays* at 4, *February 5–26.*

Dr. Gundersen.

C8. Bacteria and Other Micro-organisms in the Home.—Eight periods devoted to lectures and demonstrations on the occurrence of bacteria, yeasts, molds, and other micro-organisms in the home; in water and sewage; the principles underlying the canning of foods, etc. *Saturdays* at 11. *February 1 to March 22.*

Dr. Olive.

C10. Classes in War Gardening.—Special classes in vegetable gardening may be arranged for by clubs or groups of at least 12 persons. For particulars address Miss Ellen Eddy Shaw.

C11. Evening Course in Vegetable Growing, with special reference to War Gardens. Three lectures, illustrated with lantern slides and demonstrations. Preparation of the ground, hotbeds, and cold frames; tools and implements; cropping plans, seed sowing, transplanting, cultivating, insect and fungus pests, methods of protecting plants by sprays and other devices; harvesting and storing; the important vegetables and their varieties. An *evening* course on *Wednesdays* 8–9 p. m., *March 5, 12, 19.*

Mr. Free.

C12. War Gardens.—A practical course of six lectures and demonstrations on the subject of successful war gardens. Primarily for those who have a small garden, a vacant lot garden, or a school garden. Soils, varieties of seeds, methods of planting. These and other topics are discussed. No fee. *Mondays* at 4, *March 3 to April 7.* Mr. Free, Miss Shaw.

C13. Special Lectures on Subjects Related to Gardens.—*Thursdays* at 4, *March 6–27.*

March 6. The Small Backyard Garden—Its Plan. Mr. Leonard Barron, editor of the *Garden Magazine*.

March 13. Color Schemes for Gardens. Miss Alix S. Cameron, Erasmus Hall High School.

March 20. The Child's Garden. Miss Ruth E. Tappan, Brooklyn City Training School.

March 27. New Aspects of High School Botany. Dr. Marguerite T. Lee, Girls' High School.

D. Advanced Courses and Investigation

For the following advanced and research courses there is a charge covering all expenses, including laboratory fee, of *$30 for each full course* of 100 credit hours, and *$20 for each half course* of 50 credit hours.

Advanced Courses

D1. Mycology and Plant Pathology.—Morphology and pathology of the fungi and bacteria. Life histories of fungi; methods of control of plant diseases, etc. Prerequisite, a satisfactory college course in general botany. 100 credit hours of work. Hours to be arranged. Dr. Olive and assistant.

D2. Fresh-water Microbiology.—A course of lectures, recitations, and laboratory work on the various organisms found in drinking water. Odors, colors, etc., of drinking water; methods of microscopical and bacteriological examination. 50 credit hours of work. Hours to be arranged. Dr. Olive and assistant.

D3. Cytology.—A course of lectures and laboratory work on cell structure and physiology. Methods of cytological technique, and practice in accurate interpretation of cell phenomena. Prerequisite, satisfactory college courses in general botany and plant physiology. 100 credit hours of work. Hours to be arranged. Dr. Olive and assistant.

D4. Experimental Evolution.—Detailed studies of the nature and causes of variation and heredity. Some of the subjects considered are: Historical Resumé of the Evolution Theory, Physical Basis of Inheritance, Inheritance of Acquired Characters, Kinds and Causes of Variation, Mendelism, Biometry, Principles and

Technique of Plant Breeding. This course is open to students of college rank with a knowledge of the elements of physics, chemistry, geology, botany, and zoology. The work is primarily intended for students in pure science, and for agricultural or horticultural students fitting themselves for various professional activities in these particular fields. Three lectures and two laboratory periods a week. 100 credit hours of work. Hours to be arranged. Dr. White.

D5. Phytogeography.—A course dealing with plant distribution over the earth. Prerequisites are courses in plant ecology and geology, and a good general knowledge of climatology and systematic botany. 50 credit hours of work. Hours to be arranged. Mr. Taylor.

D6. Seminar and Journal Club.—Irregular meetings of the Garden Staff and advanced students, for the discussion of fundamental problems of botany or of general biology, and for the review of current botanical literature. Open to others on invitation.

*Graduate Study and Botanical Research**

D7. Research in Plant Physiology.—Independent investigation of problems dealing with plant functions. Dr. Gager.

D8. Research in Mycology and Plant Pathology.—Independent investigation of problems in fungi and fungous diseases of plants. Dr. Olive.

D9. Research in Plant Genetics.—Independent investigation of problems of variation and heredity, including that phase of cytology having a direct bearing on the subject matter of genetics. Dr. White.

* Courses of graduate rank offered by the Botanic Garden, when approved by the Faculty of the Graduate School of New York University, are listed as courses in the Graduate School, and are given the same credit as other graduate courses. Properly qualified students who take these courses may present them in satisfaction of the requirements for advanced degrees given by the University. Graduate credit has also been allowed elsewhere for such advanced work done at the Garden.

Cooperation with Local Schools

1. Talks at Schools.—The principals of public or private schools may arrange to have lantern talks given at the schools on various topics related to nature study, such as garden work with children, tree planting, and Arbor Day. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Address the Curator of Elementary Instruction for list of talks and for appointments.

2. School Classes at the Garden.—(*a*) Schools not provided with a stereopticon may arrange for classes, accompanied by their teachers, to come to the Botanic Garden, for lectures either by the teacher, or by a member of the Garden staff.

(*b*) Notice of such a visit should be sent at least *one week* previous to the date on which a talk is desired. These talks will be illustrated by lantern slides, and by the conservatory collection of useful plants from the tropics and subtropics. Spring and fall announcements of topics will be issued during 1919.

(*c*) The Garden equipment, including greenhouse, plant material, lecture room, lantern, and slides is at the disposal of teachers who desire to instruct their own classes at the Garden. Arrangements must be made in advance with the Curator of Elementary Instruction, so that such work will not conflict with regular classes and lectures.

(*d*) The principal of any secondary or high school in Brooklyn may arrange also for a series of six lessons on plant culture to be given during the fall to a class. These lessons will be worked out for the most part in the greenhouse. Such a course must be arranged for in advance, and the class must be accompanied by its teacher. Adapted for pupils above the fourth grade.

3. Home Gardening.—Assistance will be given to children in planning and planting home gardens. Enrollment cards for such assistance may be had on application to the Curator of Elementary Instruction. Prizes will be offered to both schools and individuals, at the annual Children's Garden Exhibit, for the best results in home gardening. This exhibit is open to all children in the city of Brooklyn, although their garden products may have

been raised at their summer homes. *Certifications must be made that the work has been done by the child himself.*

The exhibit for 1919 will be held on Saturday and Sunday, September 20 and 21. All exhibits, of schools as well as of individuals, must be brought to the Brooklyn Botanic Garden on the nineteenth of September, between 9 a. m. and 5 p. m. The exhibit will be judged on the morning of the twentieth, and will then be on exhibition for the public from ten to five o'clock of the twentieth, and from ten in the morning until four in the afternoon of the twenty-first. The announcement of prizes will be made on the twentieth. After four o'clock on the twenty-first exhibitors may remove their exhibits. Prizes will be distributed on Saturday afternoon, October 11, at three o'clock.

Silver and bronze medals will be awarded as first and second prizes for individual exhibits. A trophy is the first prize for the school making the best exhibit as a whole. A bronze statue is another trophy for the best school roof garden. Each trophy is to be competed for annually until one school wins it three times, when it will become the property of that school. A new prize will then be offered.

4. Penny Packets of Seeds.—In order to assist the above work, penny packets of seeds are put up by the Botanic Garden, for children's use. In the early spring, lists of these seeds, conditions for entry as an exhibitor, home gardening record cards, and other information may be had on application to the Curator of Elementary Instruction.

5. Conferences.—Conferences may be arranged by teachers and principals for the discussion of problems in connection with gardening and nature-study. Monday and Saturday afternoons are usually available for this purpose. Appointments must be made in advance. Address Miss Ellen Eddy Shaw.

6. Study and Loan Material.—On request, the Garden will endeavor to provide living seedlings or plant parts for study, to the extent of our facilities. Teachers may arrange to have various physiological experiments or demonstrations conducted at the Garden. Petri dishes, which must be cleaned and delivered to the Garden, will, on request, be filled with nutrient agar, ready for exposure in the study of bacteria and molds. In all cases

arrangements must be made by teachers for calling for such material, and all material loaned by the Garden must be returned promptly in good condition.

Plantations

The plantations comprise several sections, including the local flora (native wild flower garden), general systematic (trees, shrubs and herbaceous plants not native within 100 miles of Brooklyn), morphological, ecological, economic, and rock gardens, Japanese garden, and children's gardens. As noted below, under *Docentry,* arrangements may be made for viewing the plantations under guidance. They are open free to the public daily from 8 a. m. until dark; on Sundays and holidays at 10 a. m.

Conservatories

The Garden conservatories contain a collection of tender and tropical plants. Of special interest for teachers of nature study and geography is the economic house, containing useful plants from the tropics and subtropics, including the following: banana, orange, lemon, lime, citron, kumquat, tangelo (a cross between the grape-fruit—pomelo—and the tangerine), West Indian cedar (the source of the wood used for cigar boxes), eucalyptus, Manila hemp, sisal, pandanus (source of the fiber used for making certain kinds of fiber hats), fig, grape vines from north and south Africa, date palm, cocoanut palm, chocolate tree, coffee, tea, camphor, ginger, sugar cane, avocado (so-called "alligator pear"), Para and other rubber plants, banyan, religious fig of India, and numerous others.

The conservatories are open daily from 10 a. m. to 4 p. m. In this connection see also below, under *Docentry.*

Herbarium

The Garden herbarium consists at present of over 150,000 specimens, including phanerogams, ferns, mosses, liverworts, lichens, parasitic and other fungi, algæ, and myxomycetes. This collection may be consulted from 9 a. m. until 5 p. m. by those interested, and specimens submitted will be gladly identified. Address, Curator of Plants.

EFFECT OF LOW TEMPERATURES ON GREEN-HOUSE PLANTS

Having regard to the coal situation for the coming winter, a few notes concerning the experiences of the Brooklyn Botanic Garden during the winter of 1917–1918 may be of interest.

About the middle of December it was considered to be extremely doubtful if sufficient coal would be available to maintain the plant houses at a proper temperature for the rest of the cold season. It was immediately decided to conserve fuel by lowering the minimum temperature, normally maintained in all the greenhouses, ten degrees, the theory being that, although a number of plants would undoubtedly suffer by such a course, that was preferable to losing the whole of the collections by a freeze up, occasioned by using all the fuel in maintaining ideal temperatures. All but the absolutely essential heat was shut off from the laboratory building. It was soon found that these measures would not result in saving enough coal to tide us over until further supplies could be secured. It was then decided to close off a number of houses (about half) entirely and remove their contents to the remaining houses. This of course resulted in much overcrowding, and probably caused almost as much damage as lowered temperatures. Three houses, containing plants that will withstand cool conditions, from which it was not practicable to shut off the heat entirely, were maintained at a temperature just sufficient to keep the pipes from freezing. One of these houses, the Cactus and Succulent house, received the whole of its heat from the workroom below through the elevator shaft, which was left continuously open.

The following notes will give an idea of the effect of low temperatures on some of the plants.

Cactus House.—Minimum winter temperatures maintained under normal conditions, 45°–50°. Lowest temperature recorded, 30°. Temperatures of 32° recorded three times, 30° twice. The temperature fell below 40° on 25 occasions.

Very little damage was done in this house. The leaves of several species of *Pereskia* were shrivelled, but the plants other-

wise unharmed. *Euphorbia splendens* (the crown of thorns) had its leaves yellowed and shrivelled; it has since entirely recovered. Several species of candelabra "cactus" were badly browned towards the tips, but not killed. *Hoya carnosa* (the wax plant), a native of tropical Asia, was apparently unaffected. Wandering Jew (*Zebrina pendula*), growing under the benches, was uninjured, while several kinds of Boston fern (*Nephrolepis*) were badly yellowed.

Not more than three or four species of plants were killed outright, these being species of *Opuntia* and *Cereus*. It was interesting to notice the change in the coloring of the leaves of many plants; various species of *Sedum, Bryophyllum* (the sprouting leaf), *Echeveria microcalyx* and *Othonna crassifolia* being especially noticeable. The leaves of these plants changed from the normal color to a beautiful reddish brown, making them very attractive. The leaves of practically all of the fig marigolds (*Mesembryanthemum*) were extremely limp on the mornings when low temperatures were recorded, causing the plants to appear as if suffering from lack of water. They are all perfectly healthy now.

Economic House.—Minimum winter temperature maintained under normal conditions, 60°. Lowest temperature recorded, 44°. The average lowest temperature from December 20 to February 20 was about 50°.

This house contains a collection of tropical economic plants, and was used in part to accommodate the plants from the houses it was decided to close. Temporary benches were erected in the walks to take care of Begonias and a small collection of orchids. The plants more likely to withstand rough treatment were placed on inverted flower pots amongst the economic plants, which are for the most part planted in solid beds. This house is a curvilinear structure with a lantern. The dimensions are 100′ long, 50′ wide, and 36′ to the top of the lantern.

The plants actually killed by the low temperatures were as follows: The chocolate tree (*Theobroma Cacao*), Para rubber (*Hevea brasiliensis*), Indian almond (*Terminalia Catappa*), and coconut (*Cocos nucifera*). The following plants were more or less injured: *Allamanda Hendersoni, A. Williamsii,* and *A.*

Cathartica. Their leaves were badly yellowed and some fell off. On July 30 these plants were in good condition and blooming profusely. *Fittonia argyroneura* was the first plant to show signs of distress, the whole of its leaves being killed; it looks none the worse for the ordeal at present. *Fittonia Verschaffeltii,* strangely enough, was uninjured. *Piper ornatum,* growth arrested; *Norantea guineensis,* old leaves reddened, young leaves killed; *Strobilanthes Dyerianus,* growth stunted; Papaw (*Carica Papaya*), old leaves partly withered; *Malanga* (*Xanthosoma sagittifolia*), growth arrested, leaves sickly looking; *Carissa grandiflora,* leaves reddened; oil palm (*Elaeis guineensis*), leaves slightly yellowed; *Gynura aurantiaca,* old leaves browned at edges, ultimately falling off; African violet (*Saintpaulia ionantha*), edges of leaves browned, sickly yellow; banana (*Musa sapientum*), growth completely arrested.

The remainder of the plants showed no ill effects. Amongst them may be noted the following: *Kentia Belmoreana, Pandanus utilis, Cocothrinax crinita, Sansevieria guineensis, Vanilla planifolia,* begonias (various species), *Areca lutescens* and *Monstera deliciosa.*

Subtropical Economic House.—Minimum winter temperature maintained under normal conditions, 45°. Lowest temperature recorded, 28°. On several occasions temperatures of 32° were recorded, and on one moring ice one half inch thick was formed on a jar of water standing on a side bench. All the plants likely to suffer from low temperatures had been removed from this house, and only enough heat was supplied to keep pipes from freezing. Among the plants left in the house were the date palm (*Phoenix dactylifera*), *Camellia japonica,* various kinds of *Citrus,* such as orange, grapefruit, citron, kumquat, lemon; and loquat (*Eriobotrya japonica*). These were uninjured.

Fern House.—Minimum winter temperatures maintained under normal conditions, 63°. Lowest temperature recorded, 44°. The temperature fell to 50° on many occasions. The worst sufferers in this house were the stag-horn ferns (*Platycerium*), of which we have a good collection. These had just started to make their new fronds, and the result was that growth was completely arrested, and the plants have not yet fully recovered. Some of

the Selaginellas were affected, especially *Selaginella Wildenovii,* its young leaves being badly curled. The rest of the ferns were practically uninjured.

In House No. 2, one of the houses that was closed, a few plants of the water hyacinth were left. A temperature of 30° was recorded which caused many leaves to die, but the plants survived. *Sanchezia nobilis,* a native of Ecuador, was alive after several times enduring a temperature of 30°. It finally succumbed.

As an adequate supply of coal is not in sight, we have adopted similar measures this winter in order to save as many plants as possible. The following houses receive fire heat only when the temperature falls so low that there is danger of pipes freezing: Instruction houses Nos. 1, 2, and 3; propagating house No. 3, and Nos. 1, 2, 3, 4, 6, 7, 8, and 11 of the main range. Except for the instruction houses and Nos. 6 and 11 (which contain plants uninjured by low temperatures, or material easy to replace) the ventilators are kept closed so as to store up as much sun heat as possible during the day. Only in very cold weather is it necessary to use artificial heat in these houses. The mortality should be much less this year, owing to the possibility of preparing the plants for their ordeal. Without doubt, many deaths were caused last winter because of the fact that normal heat was maintained beyond the middle of December, which caused many plants to push forth new growth, not so capable of withstanding cool conditions as matured growth would be. With low temperatures maintained from the middle of November onwards, these plants ought to remain in a semi-dormant resting condition, and come through the winter much better. Some damage, of course, was caused by the overcrowded condition of the greenhouses, but this too will probably be mitigated if the plants are not actively growing when the low temperatures begin to prevail.

MONTAGUE FREE

PRESENTATION OF GOLD MEDAL

One of the best evidences of a lively sense of appreciation by the boys and girls of Brooklyn of the advantages they enjoy at the Botainic Garden was their presentation, on November 23, 1918,

of a gold medal to Mr. Alfred T. White, Chairman of the Botanic Garden Governing Committee, of the Brooklyn Institute Trustees, in recognition of all that he has done to make these advantages possible. The medal was a replica of the silver and bronze medals awarded to the boys and girls for excellence in their exhibits at the annual garden exhibit. An illustration of this medal was published in the Botanic Garden RECORD for October, 1914.

In presenting the medal on behalf of the Boys and Girls Clubs, Master Edward Campbell spoke as follows: "*Ladies and Gentlemen:* Mr. Alfred T. White has done so much for the boys and girls of the Brooklyn Botanic Garden that they felt they wanted to do something for him. We talked the matter over and thought of a plan. The result of the plan I now hold in my hand. This medal was purchased by money saved, penny by penny, by the boys and girls during the summer, and it is engraved 'To Alfred T. White, from the Boys and Girls Clubs, in appreciation of his kindness to them.' Mr. White, nothing we can do, nothing we can say, can fully show our appreciation of the interest you have taken in our work; still we ask you to accept this small token of our regard which makes you one of us."

In accepting the medal, Mr. White expressed his deep appreciation of the thought which prompted its presentation, and also emphasized the satisfaction which one derives from coöperating in the founding and work of an institution established, as is the Brooklyn Botanic Garden, for the public welfare.

GRADUATION OF GARDEN TEACHERS

On November 23, 1918, occurred the fifth annual exercises in connection with the conferring of Certificates in Children's Gardening on those who have completed our year's course, or the summer course, for the preparation of teachers of children's gardening. The program was as follows:

Music.

Introductory remarks.

DR. C. STAURT GAGER, Director of the Garden.

Address: *Children's gardening in the coming education.*

DR. MAURICE A. BIGELOW, Director of the School of Practical Arts, Teachers College, Columbia University.

Music.

Presentation of gold medal to Mr. Alfred T. White.

MASTER EDWARD CAMPBELL, Representing the Boys and Girls Clubs of the Garden.

Acceptance of the medal, by MR. WHITE.

Awarding of Certificates.

MR. ALFRED T. WHITE, Chairman of the Botanic Garden Governing Committee of the Brooklyn Institute Trustees.

Eight certificates were conferred on the following graduates: Mary L. Braman, Margaret M. Donaldson, Angelina L. Howe, Leona A. Smith, M. Helen Smith, Sylvia Wilde, Charlotte S. Young, and Mabel A. Young.

NOTES

On October 25–28 eighty trees of Schwedler's variety of the Norway maple were planted in two double rows of twenty trees each, along each side of the esplanade, leading toward the Brooklyn Museum Building. These trees replace a like number of the flowering dogwood, originally planted at the suggestion of the landscape architects, but which did not prove satisfactory. The trees average about 4 inches caliper, and about 18 feet high.

During the latter part of September the area in front of the laboratory building, west, was graded and seeded for lawn. This area has been under cultivation as war gardens for vegetables during 1917 and 1918. On account of the unusually warm weather during the last few days of October, it was necessary to mow this lawn for the first time on November 1.

The meetings of the Flatbush Garden Club, held at the Garden on October 11 and November 29, were addressed, respectively, by Miss Cornelia Geer and Miss Ogilvie, on the subject, "The Woman's Land Army."

The address to the graduating class of the School of Horticulture for Women, Ambler, Pa., was delivered on December 13, 1918, by Director Gager, on the subject, "Horticulture as a profession."

The first number (September, 1918) of a new botanical publication, *Botanical Abstracts,* appeared in November, 1918. It is the aim of this journal to give abstracts and citations of publications in the international field of botany in its broadest sense, and the plan is to issue two volumes of 300 pages each within a period of one year. Prof. Burton E. Livingston, of Johns Hopkins University, is editor-in-chief, and the editorial board, as at present constituted, comprises fifteen editors, each in charge of a separate department, with the coöperation of a large number of collaborators for abstracting. The department of *Botanical Education* is in charge of Dr. Gager, the director of the Garden. Dr. Olive, Dr. White, Dr. Gundersen, and Mr. Taylor, of the Garden staff, are collaborators. The launching of this publication is the most important event in the field of botanical periodical literature since the establishment of the *American Journal of Botany,* in 1914. Heretofore the botanical world has been chiefly dependent on Germany for its abstract journals.

Dr. Kwan Koriba, professor of plant physiology, and Dr. Jinichi Yano, professor of modern Chinese history, Imperial University, Kyoto, Japan; also Dr. Nahetaro Miura, professor of civil engineering, Kumamoto Higher Technical School, Japan, visited the Garden on October 5, 1918. They were specially interested in our Japanese garden, and commended it as one of the best examples of Japanese landscape gardening they had seen in America.

According to the *Weekly News Letter* (October 16, 1918), the U. S. Department of Agriculture has planned to issue about 1,000 feet a week of motion picture film for six months, beginning in Octboer, 1918. The primary object of the films is to aid in the "More Food" campaign. Farm labor, harvesting wheat and other crops, Red Cross pig clubs, fighting insects and plant diseases

are among subjects for the screen. Subjects of botanical interest include the story of wheat in the great wheat fields of the Pacific northwest, harvesting California cantaloupes and potatoes, citrus fruit fumigation in southern California, national forests, forest-fire fighting, drying fruits and vegetables in the home, logging timber for wooden ships, and the construction of wooden ships. Efforts are being made to provide a larger supply of these films, and a consequent wider distribution through the aid of the State College of Agriculture.

The Botanic Garden service flag, hung in the window north of the main (west) entrance of the laboratory building, contains six stars, indicating the number of our employees in service in the National Army.

The objects of the Botanical Society of South Africa, founded June 10, 1913, are stated as follows in the *Journal* of the Society, part 4, 1918. (*a*) To encourage the inhabitants of South Africa to take an active part in the progress and development of the National Botanic Gardens at Kirstenbosch, and to induce them to appreciate their responsibilities therein. (*b*) To augment the Government grants towards developing, improving, and maintaining fully equipped botanical gardens, laboratories, experimental gardens, etc., at Kirstenbosch. (*c*) To organize shows at which may be displayed the results of botanical experiments or cultural skill in improving the different varieties of South African flora. (*d*) To enlighten and instruct the members on botanical subjects by means of meetings, lectures, and conferences, and by the distribution of literature.

Rose Fete at Bourges.—The annual Rose fete held on the 16th of June last by the French Society of Rose Cultivators, took on the color of a great Franco-American day on which considerable funds were realized for the various war relief bureaux under the protection of the Public Subscription Committee of the American Red Cross. The affair was a great success. Beginning with an exhibition of roses in the garden of the Hotel de Ville (City Hall), designed by Le Notre under Louis XIV, the day

closed with a kermess. Receipts were in the neighborhood of 10,000 francs ($2,000). (*Revue Horticole,* Sept. 16, 1918 Translated from the French.)

Professor George Francis Atkinson, since 1896 professor of botany in Cornell University, and for several years botanist of the Experiment Station, died suddenly in Tacoma, Washington, about November 14, 1918. Professor Atkinson went to the Pacific coast in continuation of his extensive studies in fleshy fungi, and his last letter from there indicated that he was making excellent progress on the monograph. Professor Atkinson was one of the botanists who honored the Brooklyn Botanic Garden by his presence, and by contributing a paper to our scientific program, on the occasion of the dedication of our buildings in April, 1917. His paper, presented on that occasion, appears as the first article in volume I of the Brooklyn Botanic Garden *Memoirs.* As his colleagues at Cornell state, in announcing his death to his former students: "One of the greatest botanists of the country has passed to his reward, and his former students and contemporaries, as well as the coming generations of botanists. have lost heavily in the early passing of Professor Atkinson, for the years that seemed ahead of him promised to be his most fruitful and pleasantest."

Large Returns From Intensive Agriculture.—In an article on "Adaptations of crops to soil" (*Science Conspectus,* Boston, Vol. IV, No. 2), Prof. George E. Stone gives the following information, which is of special interest now, in connection with the widespread interest in gardening and increase of food-production:

"The vast areas of fertile soil in the West, when planted to cereals, return about $20 per acre, while our market garden soils return from $500 to $2,500 per acre. One square rod of greenhouse lettuce gives larger returns than one acre of wheat, and sometimes as much as two acres. A crop of tomatoes fetching $9,000 has been taken from less than three-quarters of an acre of glass within five mile of Boston, and one-tenth of an acre of greenhouse cucumbers in one case returned $3,500, which is at the rate of $35,000 per acre. Other instances might be given of

the enormous returns from intensive agriculture,—in reality only another term for unusually efficient farming. These returns are possible because the greenhouse grower is able largely to manufacture his environment, and to prepare his soil as he wants it; thus adapting his soil to the crop instead of the crop to the soil. When this intensive farming is in wider use the United States will be able to support many more millions of people than at present."

Insect Pests and Birds.—During the summer of 1918 a great deal of damage was done by the defoliation of forest trees on Bear Mountain and throughout the Berkshires. The injured trees included maples, beeches, and birches in the northern section through Charlemont, Cummington, and Worthington. The ravages of this insect were very destructive in 1917 and still worse in 1918. Theoretically it is possible to control or check the injury by spraying, but in actual practice the cost, over widespread areas of forest, is prohibitive. The defoliating insect is *Heterocampa guttavitta,* popularly known as "saddled prominent" or "antlered maple caterpillar." In a letter to the editor of the RECORD, Dr. E. P. Felt, New York State Entomologist, gives a very timely and important suggestion as to the importance of the conservation of native birds as the natural enemy of insect pests. Dr. Felt writes:

"There is little that can be done under average forest conditions owing to the fact that spraying is too costly. I have, however, used these outbreaks to call attention to the fact that our native birds are among the most effective natural checks upon leaf-feeding forest insects and, in connection therewith, urged better protection for them. You may be interested to know that a considerable reduction in bird life since about 1898 appears to have been followed by increasingly frequent and severe defoliations of forest areas."

The announcement was recently made in the British Parliament by the president of the Board of Agriculture that active steps have been taken with a view to the establishment at Cambridge of an Institute of Agricultural Botany, the primary func-

tion of which will be the breeding and distributing of improved varieties of agricultural crops. The plan in question was very fully described by Mr. Lawrence Weaver, of the Board of Agriculture, at a meeting of the Agricultural Seed Association held on July 15. It appears that the new institute will be modelled on the famous Swedish plant-breeding station at Svälof, and that its activities will follow two distinct lines, one of which will be purely scientific, while the other will have a commercial outlook. More precisely, the scientific wing will be concerned with the producing of pure cultures of new varieties on the field-plot scale; the economic wing will deal with the growing and distribution on a large scale of these varieties. It is announced that subscriptions towards the establishment of the new institute, amounting in the aggregate to upwards of £30,000 have already been received, including a sum of £10,000 down and £2,000 a year for five years from a commercial firm, and that the Board of Agriculture will provide the necessary buildings and equipment. (*Science* N. S. 48: 572. D 6 '18.)

A correspondent of the American Rose Society, who was at the very front in Belgium on November 11, reports that the next day, November 12, the roads were crowded with Belgians returning home, bringing their few remaining home possessions with them, on wheelbarrows, in baby coaches, and on their backs, Of beasts of burden they had none, nor of ordinary wheeled vehicles. The retreating Huns had stripped them after four years of continual oppression. The same correspondent reports that he was moved to tears as he saw these folks returning home, all carrying flowers, wherever they could find a blossom to bedeck themselves.

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PUBLICATIONS
OF THE
BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the *Annual Report* of the directors and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy.

MEMOIRS. Established, July, 1918. Published irregularly. Volume I, *Dedication Papers:* comprising scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. Price $3.50, plus postage.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

9. *The growth-forms of the flora of New York and vicinity.* 9 pages. 1915.

10. *Inheritance studies in Pisum. I. Inheritance of cotyledon color.* 18 pages, 4 tables. 1916.

11. *Studies of teratological phenomena in their relation to evolution and the problems of heredity. II. The nature, causes, distribution and inheritance of fasciation with special reference to its occurrence in Nicotiana.* 29 figures, 30 tables. 1916.

12. *Endemism in the flora of the vicinity of New York.* 10 pages. 1916.

13. *The origin of new varieties of Nephrolepis by orthogenetic saltation. I. Progressive variations.* 28 pages, 6 plates. 1916.

14. *A white-cedar swamp at Merrick, Long Island, and its significance.* 10 pages, 5 plates. 1916.

15. *Present status of the problem of the effect of radium rays on plant life.* 8 pages. 1916.

16. *Flora of the vicinity of New York.* 6 pages, fig. 1. 1917.

17. *Endophyllum-like rusts of Porto Rico.* 9 pages, 3 plates. 1917.

18. *Inheritance of endosperm color in maize.* 11 pages. 1917.

19. *Studies of inheritance in Pisum. II. The present state of knowledge of heredity and variation in peas.* 102 pages. 1917.

20. *Inheritance studies in Pisum. III. The inheritance of height in peas.* 7 pages, fig. 1. 1918.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Fifty cents a series. Single numbers 5 cents each.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $5.00 a year.

HERBARIUM OF
THOMAS J. DELENDICK

BROOKLYN BOTANIC GARDEN RECORD

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OF THE

BROOKLYN BOTANIC GARDEN

1919

FOR THE ADVANCEMENT OF BOTANY AND THE SERVICE OF THE CITY

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DR EDGAR W. OLIVE, *Curator of Public Instruction*

DR. O. E. WHITE, *Curator of Plant Breeding*

MISS ELLEN EDDY SHAW, *Curator of Elementary Instruction*

MISS RAY SIMPSON, *Librarian*

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MISS NAOMI HOWELLS, *Laboratory Assistant*

MISS HELEN M. SMITH, *Library Assistant*

MR. LOUIS BUHLE, *Photographer*

————————, *Garden Aid*

MR. HERMAN KOLSH, *Foreman*

* On leave of absence during 1919, for reconstruction work in France.

FIG. 1. View of the southern part of the Botanic Garden, taken from the central cupola of the laboratory building. War gardens of employees in front of the conservatories; the rock-garden against the trees at the right background; the small building at the left, beyond the conservatories, is the children's building, with the children's gardens extending beyond and to the right. The middle distance is occupied by a portion of the general systematic section; the line of trees being the willows along the brook. At the right of the path between the conservatories and the children's building is the potato field, a temporary war-time planting. Beyond is Flatbush and the ocean (five miles distant). The trees at the extreme right are in Prospect Park. Washington Avenue at the extreme left.

HERBARIUM OF
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THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. VIII April, 1919 No. 2

EIGHTH ANNUAL REPORT OF THE BROOKLYN BOTANIC GARDEN, 1918

REPORT OF THE DIRECTOR

TO THE GOVERNING COMMITTEE OF THE BOTANIC GARDEN:

Gentlemen: I have the honor to present herewith the eighth annual report of the Brooklyn Botanic Garden, of the Brooklyn Institute of Arts and Sciences, for the year 1918.

The Garden and the War

The influence of the war, and of the disturbed conditions resulting therefrom, has been felt in many ways. To this cause may be chiefly attributed a marked decrease in nearly all numerical totals for 1918, covering membership, attendance, and registration in classes. On the other hand there has been a most gratifying maintenance of level, and even increase, in the totals covering accessions of plants, herbarium specimens, books, and income of private funds for current expenses and for endowment. Statements covering these and other similar items will be found in the appended reports of the heads of the various departments, in Appendix 2 (p. 82), and in the financial statements (pp. 76–80).

Men in Service.—Our service flag contains six stars, all representing men from the gardening and laboring forces. In De-

cember, leave of absence was granted to Miss Jean A. Cross, assistant curator of elementary instruction, for reconstruction service in France during 1919. Miss Cross will sail in January with the Wellesley Unit, under the auspices of the Y. M. C. A.

Subscriptions to Liberty Bonds, Red Cross, et al.—In the Red Cross drive of May 20–27, for subscriptions to the Second War Fund of the American Red Cross, 100 per cent. of the employees of the Garden were enrolled as subscribers, the total amount of the subscription being $225.20. This does not represent the total amount subscribed by our employees, but only the portion of their total subscriptions placed through the Garden office.

Subscriptions to the Fourth Liberty Loan.—Subscriptions to the Fourth Liberty Loan from members of the staff and other employees amounted to a total of $3,250.00. Of our monthly employees 82 + per cent. subscribed to this loan.

The figures for subscriptions placed through the Garden office, for all four loans, are as follows:

	Amount	Per Cent. All Monthly Employees	Per Cent. Scientific Staff
1st Loan	$ 2,500	51+	100
2d "	1,800	59+	100
3d "	2,550	55+	100
4th "	3,250	82+	100
Total	$10,100	61+	100

The above figures do not represent the total amounts subscribed by employees of the Garden, as many of our people placed subscriptions through other organizations, as well as through the Garden.

Coal Shortage.—The Garden started the winter season of 1917–18 with 466 tons of coal on hand, when the fires were lighted in the heating plant, on October 1, 1917. Part of this coal (about 225 tons) was stored in the coal cellar, and the remainder (241 tons) in the yard north of the coal cellar, between the laboratory building and the Washington Ave. street fence. Planks were laid under the coal, and retaining fences of boards were built along the fence and next the building. The first month of the year was the most severe January, in point of low temperatures, in the history of the Weather Bureau. Excessive

snow also increased the difficulty of transportation by rail. On February 2d we used the last of our coal, and for some time thereafter received only one load of about five tons every two or three days. The conservatory collections were saved only by the generous loan of a small load of coal by Park Commissioner Harmon and another load by the subway contractors who were operating on Eastern Parkway.

By moving all the plants from Houses 1–4, 7 and 10 into the economic house and two wings, and by shutting the heat off from about one half of the building, heating only the offices in use and the library, we cut down the coal consumption to about three tons a day. We observed the second and fourth Garfield (coalless) Mondays, but the saving by doing this was slight, and hardly enough to be a factor worth considering, since coal required to heat a portion of the building over and above that required to save the plants in the conservatories was almost negligible—probably not more than a quarter of a ton in twenty-four hours. We lost several plants, including the *Terminalia* tree, and all of them suffered more or less, from loss of leaves and otherwise, by the great reduction of temperature.

During February and March coal was received in various sizes —buckwheat, nut, egg, stove, and some soft coal—sufficient to maintain living temperatures in part of the laboratory building and plant houses, but not until about March 1, was it possible to restore normal temperatures in the plant houses.

On account of injury to the collections, shortage of labor, and threatened shortage of coal during the early fall of 1918, when the collections were again congested into smaller quarters, the conservatories have remained closed to the public during the entire calendar year.

War Gardens.—During the year 342 vegetable gardens, 8 ft. by 10 ft., and 67 gardens 10 ft. by 20 ft., were cultivated on the children's garden plots. The total area actually under cultivation was 42,360 sq. ft., or slightly less than one acre (43,560 sq. ft.). The total cash value of the crops taken home, estimated in terms of the market prices on the day the various crops were harvested, was over $4,800.

It should not be inferred from these figures that, as a com-

mercial proposition, one could realize nearly $5,000 from any crop or combination of crops on an acre of land; it does mean, however, that economies were made possible in the purchase of green vegetables to the extent of the figure given, and economy in food consumption and distribution was one of the chief results sought by gardening in 1918.

Twenty-two war gardens, averaging about 1,100 sq. ft. each, were also cultivated by adults, monthly employees of the Garden, and members of the city police force. A Model Small Vegetable Garden, 20 ft. by 40 ft., maintained by the head gardener this year, as last, attracted wide public attention, and proved to be of large educational value. The cash value of the produce from the model garden, estimated at current market prices, was $38.75. The average cash value of the crops from the other war gardens cultivated by adults was about $25.

Lectures on Vegetable Gardening and Related Subjects.—These fall under four heads as follows:

(a) *Six Monday Afternoon Lectures to Teachers, on School Gardening.* March 18–April 22, at 4 p. m. These were well attended.

(b) *Nine "Win-the-War Garden" lectures,* free to the public, Wednesday evening, April 13, and Sunday afternoons, April 7–May 26. Further reports are given in the report of the curator of public instruction (p. 62).

(c) *Coöperation with the Bureau of Public Lectures of the Board of Education.* All the lectures on Vacant Lot Gardens, announced by the Board of Education for Brooklyn, have been given by Miss Cross, assistant curator of elementary instruction, and Mr. Free, head gardener. Miss Cross has given five and Mr. Free eight, all at public schools in various parts of the Borough. The coöperation of the Brooklyn Botanic Garden was acknowledged in all the announcements issued by the Board of Education.

(d) *Lecture to City Employees,* given by Mr. Free at 5:10 p. m., at the Municipal Building, Manhattan, April 16th, on invitation from the Mayor's Committee of Women on National Defense.

Bureau of Information and Soil Inspection.—As last year, the

Garden has offered the services of the head gardener, Mr. Free, without charge, to inspect the soil on vacant lots and other tracts in Brooklyn, to report on soil treatment necessary, and to give advice on planting, cultivation, insect and fungus pests, and the harvesting and storing of crops. A contribution of private funds has made it possible to command the services of an automobile, and Mr. Free secured a license enabling him to operate the car himself.

Cooperation with the Federal Government.—Dr. White, curator of plant breeding, and Dr. Olive, who has charge of our plant disease work, have cooperated with the federal government in war-time activities, the former in castor bean investigation, and the latter in the plant disease survey. Fuller details will be found on pages 98, 119, and 121, and in the BOTANIC GARDEN RECORD for July and October, 1918.

FIG. 2. Potato field, 1918. A war-time planting on the south addition.

Five members of staff have also cooperated with the botanical section of the National Research Council in the collection of information concerning economic botany, and the commercial utilization of plants and plant products.

Investigations

Plant Breeding.—Investigations of heredity and variation in peas, castor beans, and corn have been carried on in 1918 as in preceding years, by and under the direction of the curator of plant breeding. Cooperative experiments with the department of plant pathology, of the Virginia Experiment Station, on the inheritance of bean rust were begun. This is a very serious disease of beans in some sections of the country, and resistant varieties of the best commercial types are very much desired.

The studies on peas, castor beans, and corn have continued to yield a large amount of data concerning inheritance in plants and by extension, heredity in general. Part of these data have been made available to those especially interested and to the general public, through public talks, and through the publication and reading of the papers mentioned in Appendices 3 and 4 of this report. Various reviews in such publications as the *Experiment Station Record, Botanical Gazette, Monthly Bulletin of Agricultural Intelligence* and *Plant Diseases,* of the International Institute of Agriculture at Rome, Italy, and in various textbooks on breeding have further facilitated the distribution of this information.

Data on castor beans have had a very practical aspect in relation to growing sufficient quantities of these beans in 1918 for lubricating the rotary motors of the scout type of aeroplane. From about August 1 until November 16, the curator of plant breeding was on leave of absence as castor bean specialist for the United States Department of Agriculture. In this capacity he acted as a field advisor to the officers of the Castor Bean Section, Aircraft Production, War Department, and in company with the various field officers of this section, traveled over Florida, Georgia, Alabama, Mississippi, Louisiana, Texas, Oklahoma, Kansas, Arkansas, and parts of Tennessee and Missouri, investigating conditions for commercially growing castor beans and giving advice to the 1918 U. S. contractors and their growers on seed selection, harvesting, and growing castor beans. During his absence, Mrs. White and Mrs. Burdick had charge of the taking of data on his cultures.

At present the plant breeding and heredity work is especially

hampered through lack of sufficient greenhouse space for growing winter cultures, and through insufficient clerical and gardening assistance for keeping pedigree records and taking proper care of the cultures. A calculating machine of the most approved type is much needed for handling the statistical side of the work. It has not been possible during the past year to afford the additional clerical and gardening assistance to the inadequacy of which attention was called in the preceding annual report.

Plant Diseases.—Plant disease investigations by Dr. Olive have been largely determined by the war conditions, and chiefly confined to cooperative work with the Plant Disease Survey and Cereal Disease Officer of the United States Department of Agriculture, including a field study of the serious and recently introduced potato wart disease.

Flora of Long Island.—Field studies and collections have been made throughout the year by the curator of plants, in continuation of his work on the flora of Long Island. The field work has included Gardener's Island, hitherto almost neglected botanically.

Plantations and Grounds

Development and Maintenance.—Work on the grounds began on Monday, March 18, with a small force of twelve laborers. While the total number of labor days was slightly in excess of that for 1917, it has not been possible to accomplish as much developmental work as needed to be done on account of the extra labor required for maintenance. This increases each year, as the area put into lawn or otherwise developed increases, and available labor has not increased in proportion. The city appropriation for labor is still not sufficient properly to care for the developed portions of the grounds and to continue the development of unimproved areas as rapidly as desirable. Several acres still remain to be top-soiled and surface-graded. As the curator of plants, in his appended report, well states—the grounds have not been kept in the condition which the authorities of the Garden and the public have a right to expect because the amount of labor available is insufficient.

Gardening Operations.—A beginning was made of the ornamental evergreen planting at the Malbone St. gate, comprising

azaleas, *Pachysandra terminalis, Arctostaphylus* (bear-berry), *Ilex crenata,* and Austrian pines, the area north of the gate being partially planted. This is an important entrance, and one of the most frequently used, and it is highly desirable that this planting be completed in 1919, in accordance with the adopted plans of the consulting landscape architect.

Extending the Systematic Section to occupy all of the area assigned to it could not be completed, as about ¾ acre of this area was given over to raising potatoes as a war-garden measure.

New Trees for the Esplanade.—On October 25–27 eighty specimen trees of Schwedler's variety of the Norway maple were planted in double rows on either side of the esplanade leading to the Museum embankment. These trees, averaging 3–4 inches caliper, are 18–20 feet in height and replace the flowering dogwoods, recommended by the landscape architects, and which, after a trial of four years, proved unsatisfactory.

Loss of White Birches.—In my preceding report I called attention to the ravages of a destructive disease of the white birch, caused by the bronze birch-borer, followed by one or more parasitic fungi. This disease is fast exterminating all the white birches, not only in the Garden, but in Prospect Park, and generally throughout the borough of Brooklyn. The Garden has lost over fifty trees, leaving many bare spots, especially around the Japanese garden.

Effects of the Severe Winter.—The winter of 1917–18 was the most severe in Brooklyn since the establishment of the weather bureau. A period of below zero temperatures the first of the year was followed by a sudden rise to 50° on January 12, accompanied by a wind reaching a maximum velocity of 84 miles an hour. As a result of this combination of extreme cold and extreme drought some 24 species of trees and shrubs, ordinarily hardy, were completely killed, 20 species were killed to the ground, and about 68 species were severely injured. A full account of this injury may be found in the Garden Record for July, 1918.

New Accession System.—The report of the curator of plants calls attention (p. 57) to the new loose-leaf system of accession records, devised by Dr. Gundersen, and replacing the card cata-

log system in vogue since the Garden was established. The new system has numerous advantages over the old, not the least of which is the greater facility for getting the plantations well labeled.

Ecological Section.—Dr. O. E. White, curator of plant breeding, was given charge of this section in 1918, and over 200 new labels were made and a large number of new plants added to illustrate the various relations of plants to factors of environment. The development of such an exhibit to a point of maximum beauty and instructiveness is much hampered by lack of expert gardening assistance.

Vandalism.—The destruction by children and adults of some 500 Trilliums, newly planted, to which attention is called in the report of the curator of plants, is only one of the too numerous instances of vandalism, involving the rock garden, iris collection, Japanese garden, and the labels generally. This vandalism is not only disheartening, but is expensive, and greatly restricts and retards the development of the plantations as an educational exhibit. The only remedy is: first, a new fence that cannot be climbed; second, provision of a larger number of gardeners and guards, so that each man can be held responsible for both the upkeep of a definite area, and its protection during the hours when the Garden is open to the public. This plan was recommended more in detail in my preceding annual report.

Statistics.—A total of 658 living plants were added to the collections, as against 651 last year, and 22 were distributed in exchange, as against 422 the year before. Seven hundred and twenty-six seed packets were received from other botanic gardens, and 1,980 sent in exchange. For 1917 the corresponding figures were 401 and 470.

Conservatories

The closing of the conservatories to the public throughout the year as a result, directly and indirectly, of the shortage of coal has already been noted (p. 26). It is anticipated that we shall be able to reopen them early in 1919.

Already our conservatory plants, both in number and in stature, have begun to outgrow the present range of houses, and

further expansion is possible only to a very limited degree. Within a year or two we shall have to face the problem of building a new and larger range.

Herbarium

Accessions.—During 1918 the phanerogamic herbarium (flowering plants and ferns) increased by 2,311 specimens, and the

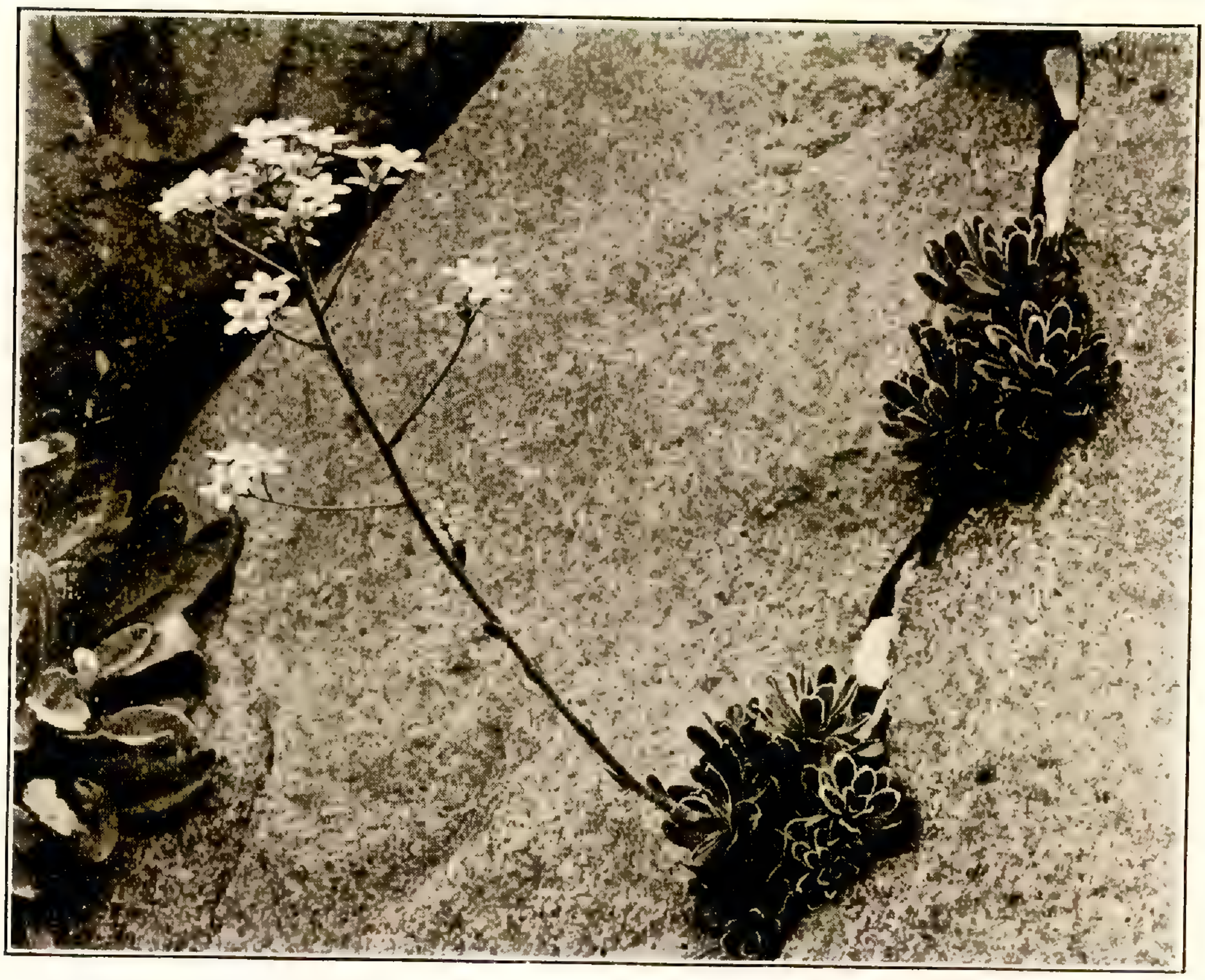

FIG. 3. Saxifrage (*S. Macnabiana*) in the rock-garden.

cryptogamic by 1,900, a total of 4,211. A total of 1,068 duplicate cryptogamic specimens were distributed in exchange. Based on careful estimates, the total number of herbarium specimens is as follows:

Phanerogamic:	
Mounted	81,600
Unmounted	11,900
Cryptogamic	56,500
Total	150,000

Cooperation with the New York City Board of Health.—During July the Garden furnished to the Brooklyn Branch of the Department of Health mounted specimens of the poison ivy, and also of the Virginia creeper for comparison, to be used in the six district offices of the department for purposes of identification. It is proposed by the Department to take measures to eliminate, as far as practicable, not only poison ivy, but also the great ragweed, the pollen of which is regarded as an important contributing factor in causing hay-fever. In connection with the latter the Garden has also supplied the Borough offices of the Health Department with herbarium specimens of the ragweed, both the form with incised leaves (*Ambrosia trifida*) and the entire leaved form (*Ambrosia trifida* var. *integrifolia*). The Department was also supplied for distribution with a quantity of the Botanic Garden *Leaflets* on treatment of poison ivy poisoning. In October mounted herbarium specimens of the jimson weed (*Datura Stramonium*) were furnished for similar use. Cases of serious poisoning, especially of children, by eating portions of the jimson weed are not uncommon.

Library

Accessions.—Of the 809 volumes added to the library during the year, 242 were accessioned as from the bindery. The accessions for 1917 totaled 398. Of pamphlets, 384 were added as against 475 last year. Serial publications have increased by 37, the total number received now being 343, of which 257 are in exchange for our own publications. The numerous gifts are listed in Appendix 2 (p. 81). Special attention is called to the valued gift of autographed letters, manuscripts, drawings, and photographs of botanists, by Mrs. Annie Morrill Smith, and the gift of 23 volumes by Mrs. Joseph Epes Brown.

Assistance.—On account of unusual labor conditions resulting from the war, it has been practically impossible, at the amount available for salary, to fill the position of library assistant for which provision was made in the annual budget. Work has been accumulating for a number of years, beyond the ability of any one person to handle it, and every effort must be made to secure

funds (not appropriated by the city) and fill this position for 1919.

Department of Public Instruction

Cooperation with Schools.—Hitherto, each year has shown a gratifying increase in the use of the Garden by public and private schools, but during 1918 the unusually poor transit facilities tended to decrease the number of visiting classes. The numbers were also further diminished by the plan (see p. 67) to provide more intensive work for a smaller number, especially in connection with certain conditions arising on account of the war.

It may not, perhaps, be amiss to call attention here to the fact that while, in certain phases of our work, figures of attendance are a fair, though not an unqualified indication of success, there is, on the whole, no kind of an organization whose work is so poorly and inadequately reflected and recorded in terms of quantity as an educational institution. True, it is often considered typically American to estimate the worth of a thing from its size, and colleges and universities have not been guiltless of parading figures of large attendance as an evidence of large accomplishment. But there is probably no class of institutions where large figures may so often have just the opposite significance. By centering our energies on giving "popular" lectures to large audiences of children and adults in our lecture hall we could easily more than double any figures of attendance reported in the department of public instruction. But, while recognizing that such lectures do have value and should form a part of our educational program, we believe that they possess the least educational value of all forms of instruction, especially for children, and so we have put forth our best effort in other directions.

Over 4,380 pupils visited the Garden during the year from public and private schools, and the attendance at various lectures and talks given outside the Garden by various members of staff was not less than 10,000.

Five out of eight Brooklyn high schools have depended on the Garden during the year for the filling of Petri dishes with sterile nutrient agar for use in the study of bacteria and molds.

The curator of elementary instruction calls attention (p. 68

infra) to the fact that, during the year, 56 schools were represented in our children's garden work, distributed as follows:

High Schools, 6. Private Schools, 4.
Public Elementary Schools, 35. Parochial Schools, 11.

In addition to the above figures, classes accompanied by their teachers visited the Garden during school hours from 50 schools, for lectures and demonstrations in the conservatories and plantations, and 44 schools were represented by pupils in our greenhouse and indoor nature study classes on Saturdays and outside of school hours on other days.

Provision for Scholarship and Prizes.—In September, 1914, the Garden inaugurated its first annual Children's Garden Exhibit. The cost of the trophies, cups, medals, and other prizes awarded at these exhibits has been met from income derived from tuition and sales. This source of revenue has been uncertain, and, in consideration of other demands made upon it, inadequate. It is therefore a pleasure to announce that the chairman of the Botanic Garden Governing Committee, Mr. Alfred T. White, has made provision for these prizes for 1918 and annually thereafter (see Appendix 2), and also for a scholarship of the value of $100, to be awarded to the boy or girl who has taken class work at the Brooklyn Botanic Garden for not less than three years, and who has shown marked ability along botanical and agricultural lines, both at the Garden and in his high school courses, as attested by his principal and teachers. This will be known as the Alfred T. White Scholarship, and will be awarded for the first time in 1920.

Special mention should be made of the prizes for excellence in back yard gardens, in the form of War Savings Stamps to the face value of $45.00, and of prizes for making the best use of a plot in the children's gardens at the Botanic Garden, also in War Savings Stamps of the face value of $25.00.

In addition to the above, twenty prizes of ten Thrift Stamps each (ten to boys and ten to girls) were awarded to those who were most generally helpful in connection with the children's garden at the Botanic Garden. Promptness, regularity of attendance, effort, accomplishment, and other points formed the basis of this award.

Prospectus.—The *Prospectus* of courses, lectures, and other educational advantages offered to members and to the general public, lists 37 elementary courses and 9 advanced and research courses, in addition to various lectures, talks at schools, teachers' conferences, docentry, and the opportunities afforded by the plantations, conservatories, herbarium, library, and otherwise.

Botanic Garden Classes.—The registration in our own classes reached a total of 3,386, with a total attendance of 24,483. Details concerning our war garden work are given above, on page 27.

Public Lectures and Addresses.—A total of 80 public lectures and addresses were given by members of staff, of which 15 were given at the Garden, and 65 outside the Garden.

Penny Packets of Seed.—On account of the increased cost to us of seed, it was necessary in 1918 to charge two cents a packet for our "penny" packets of seed. Partly on this account, but perhaps more largely on account of the vigorous activity of other organizations, educational and commercial, undertaking to sell seeds to children for war gardens, the total sale of packets reached only 94,000, as against 120,755 in 1917. We feel, however, that even with the diminished sales, the results were more substantial and gratifying, for the seeds were used with more care, and a larger percentage of packets apparently resulted in successful crops. These more satisfactory results may be attributed in part to the general war garden interest, but more largely to our own educational work along these lines during the past five years.

First Motion Pictures.—Motion pictures were used for the first time at the Garden on October 5, when three reels illustrating plant life, the commercial preparation of manilla hemp fiber, and other subjects, were exhibited to the boys and girls who had plots during the year in our children's gardens. On this occasion the Boys' and Girls' Clubs presented to the director of the Garden the sum of $36.50 for the support of a French war orphan.

Effect of the Pandemic.—The attendance of classes from schools and at our own Garden classes during October was diminished by the pandemic of influenza and pneumonia, the num-

FIG. 4. Biology Class and teacher from Bushwick High School, Brooklyn, studying trees under the guidance of a Garden docent.

ber of visiting classes falling to zero during the week of October 14.

Fifth Annual Children's Garden Exhibit.—The Fifth Annual Children's Garden Exhibit was held at the Garden, September 13 and 14, the judges being Mr. Henry Hicks, Westbury, L. I., Mr. Edward Mahoney, of the Fairview Children's Gardens, Yonkers, and Mr. Montague Free, our head gardener. The prizes awarded, including a total of $120.00 (face value) in Thrift Stamps and War Savings Stamps, besides trophies, silver cups, bronze and silver medals, and certificates of honorable mention, were presented at formal exercises held in the lecture hall on Saturday afternoon, September 28.

On the following Saturday morning, October 5, at 10 o'clock, occurred the third annual ice-cream party of the boys and girls of our children's gardens, and at 11 o'clock occurred the first public exhibition at the Botanic Garden of motion pictures of plant life, referred to above.

Graduation of Garden Teachers.—On November 23 occurred the fifth annual exercises in connection with the conferring of Certificates in Children's Gardening on those who have completed our year's course and the summer course for the preparation of teachers of children's gardening. Eight certificates were conferred. The address was given by Prof. Maurice A. Bigelow, director of the School of Practical Arts, Columbia University, on "Children's Gardening in the Coming Education." The certificates were conferred by the chairman of the Botanic Garden Governing Committee, Mr. White.

Presentation of Medal.—One of the best evidences of a lively sense of appreciation by the boys and girls of Brooklyn of the advantages they enjoy at the Botanic Garden was their presentation, on November 23, 1918, of a gold medal to Mr. Alfred T. White, Chairman of the Botanic Garden Governing Committee of the Brooklyn Institute Trustees, in recognition of all that he has done to make these advantages possible. The medal was a replica of the silver and bronze medals awarded to the boys and girls for excellence in their exhibits at the annual garden exhibit.

Children's Room.—In my preceding report I called attention to the desirability of fitting up the children's room for the boys

and girls who are coming to the Garden in ever-increasing numbers. Some 800 of them are enrolled as members of our Boys' Club and Girls' Club, and during the past five years the children's room, unfinished and unfurnished, has been the meeting place for several thousand boys and girls. It ought to be made as attractive and interesting as possible.

Woman's Auxiliary

The absorption of women in Red Cross work and other activities connected with the war, has rightfully excluded almost every other interest during the past year, and social interests, here as elsewhere, have been at very low ebb. In view of this general situation the Garden especially appreciates the contribution of the Woman's Auxiliary toward the success of the annual spring inspection, on May 28.

Annual Spring Inspection

The sixth annual Spring Inspection of the Garden by trustees, members and their friends, was held on the afternoon of May 28. On account of a severe thunder shower the visit to the plantations followed the serving of tea in the rotunda of the laboratory building. During the assembling of guests in the lecture hall, colored lantern slides of native spring wild flowers were exhibited.

Employees

Number of Monthly Employees.—The monthly pay-roll for December comprised 31 persons, of whom 19 received all their salaries from the tax budget appropriation of the City, 2 from private funds alone, and 10 from both funds. The position of library assistant was filled only at irregular intervals for reasons indicated elsewhere (p. 72).

Per Diem Labor.—The number of day laborers varied from a maximum of 19 on March 29 to a minimum of 3 at the close of the season (November 22), as compared with 18 and 11, respectively, for 1917. The total number of labor days was 3,030, as against 2,956 in 1917. As the curator of plants points out in his report, this slight increase is only apparent, since the eight

hour day (*vs.* nine hours heretofore) became effective on May 27. The disturbed conditions of the labor market also made it impossible to secure as efficient and steady labor as in former years, although the rate was $2.75 a day until August 2, and $3.00 thereafter, as compared with 1917, when the rates were $2.25 until May 11, and $2.50 for the remainder of the year.

Publications

Record.—Volume VII of the Brooklyn Botanic Garden RECORD, quarterly, contained only 128 pages and eight illustrations, as against 174 pages and thirteen illustrations in volume VI. An attempt was made to reduce the bulk of all publications in harmony with the request of the Pulp and Paper Section of the War Industries Board, for the purpose of conserving the limited supply of pulp and print paper.

Leaflets.—For reasons just mentioned, Series VI of the *Leaflets* were reduced from fourteen to eight numbers, with two of double size, and, as last year, the series was chiefly devoted to topics related to war gardening.

Contributions.—Only one number of the *Contributions* was published, as against four in 1917.

American Journal of Botany.—Volume V of the *Journal* contained 555 pages, 37 text figures, and 36 plates, as compared with 641 pages, 94 text figures, and 31 plates in 1917—a decrease of 81 pages, again reflecting the endeavor to reduce the consumption of print paper.

Memoirs.—Volume I of this new series, containing scientific papers presented at the dedication exercises, April 20–21, 1917, was issued on July 6, comprising 33 contributions, 521 pages, 28 plates, and 41 figures in the text. The edition was 500 copies. Numerous letters in commendation of the general character of this publication and especially of its appearance at that time, were received from directors of other institutions, and from botanists in various universities. The ideal of the Botanic Garden is to be able to issue a volume of the *Memoirs* annually.

Prospectus.—The *Prospectus* of courses, lectures, and other educational advantages offered to members and to the general

public was issued for the first time with a cover, as an advance reprint of pages 1–14 of the RECORD for January, 1919.

Miscellaneous.—Forty-nine publications by members of staff appeared during the year, as compared with 34 the year previous. These include scientific papers, articles, reports, reviews, and one book, on *War Gardens,* prepared by the head gardener, Mr. Free, at the request of the publishers, and issued by Harper and Brothers in May.

Financial Matters

City Appropriation for Maintenance.—The tax budget appropriation for maintenance for 1918 was $53,229.00, as against $43,258.94 available in 1917—an increase of $9,970.06. This increase was made necessary by the occupation of our completed buildings, the normal expansion of our plantations and of our educational and scientific work, and by the increased cost of personal service and other items of maintenance. The amount appropriated, which was $6,575.80 less than the amount requested, proved quite inadequate. The total deficit on all accounts was $4,562.73, including partial salaries of two positions ($1,845) for which a City appropriation was asked but not granted. The deficit was met by special contributions, again diverting funds sorely needed for the educational and scientific work for which the Garden was established.

In addition, private funds were required for the following items of repairs, replacements, and permanent improvements, properly chargeable to City appropriations:

Repairing concrete floors	$ 342.00
Electric wiring	552.50
Weatherstripping windows and doors	484.75
Total	$1,379.25

Private Funds Income.—The appended Financial Statement shows that the total income from endowment, membership dues, collections fund, special subscriptions, tuitions and sales, and other sources was $24,355.03 as against $18,210.69 for 1917, an increase of $6,144.34. Of this increase $4,526.41 represents the amount credited to the Botanic Garden from the General Endowment income of the Institute.

The private funds monthly pay-roll totaled for the year $4,650.50. This included the salaries of the two positions for which appropriations were requested from the City, but not granted, bonuses of $2,085.50 voted to members of staff in consideration of the unusual conditions incident to the war, and the part time salary of one position properly chargeable to private funds ($720.00). A deficit of $375.30 on wages of per diem laborers was also met from private funds.

Of the total private funds income, there was available for the increase of collections and other educational and scientific purposes, $19,792.30. If to this figure we add the salaries of the professional staff ($19,100.00), including the full salaries of the director and other staff members whose duties are largely or partly administrative, it appears that we have maintained a plant at a cost of $38,691.73 for the purpose of educational and scientific work, for which purpose we have expended directly barely $38,892.30. As time passes the latter figure should be greatly increased in proportion to the former.

Recommendations

New Positions. (*a*) *Honorary Curator of Japanese Gardening and Floral Art.*—The Japanese garden should have the constant supervision of a curator, thoroughly conversant with that branch of landscape architecture, and competent to advise the Garden on matters of Japanese floral art, and on books and other collections related to and growing out of our having the Japanese garden.

(*b*) *Curatorial Assistants.*—The physical labor of caring for scientific collections and conducting laboratory and field work is always heavy, and increases yearly as our collections and activities enlarge. There is urgent need for an assistant in the laboratories and cryptogamic herbarium, and for a mounter in the phanerogamic herbarium. If funds become available I recommend the creation and filling of these three positions in 1919.

Rose Garden.—It is desirable as soon as possible, to develop the unimproved area of about one quarter of an acre, immediately north of the laboratory building. The consulting landscape architect, Mr. H. A. Caparn, has prepared a preliminary

plan for a rose garden on this area. The plot is admirably suited for such an exhibit, and I would recommend the adoption of this site, and the laying out of the rose garden as soon as funds can be secured for such a purpose, and for its annual up-keep. The director will be pleased to show the plans, and discuss the project further with any one interested.

Building and Conservatory Plaza.—We have now been in our completed laboratory building and conservatories nearly two years, but the approaches have not yet been developed in accordance with final plans. This leaves the building without proper setting, and the condition should be remedied during 1919, if possible.

Preparation and Publication of Plans.—Things we should obviously accomplish include, of course, the completion of the development and planting of our grounds; grading (especially at the northern end), planting, the construction of water basins, fountains, and stone steps, the erection of a new fence, and especially the provision of five or six entrances (and notably the one on Eastern Parkway). Most of these things will doubtless require appropriations of corporate stock of the City of New York. Careful studies should be made by architects and landscape architects so that the larger projects for structures may be placed before us in concrete form, and in some detail. I believe that the preparation and especially the publication of such studies would not only react in a desirable way upon ourselves, but that there would be a distinct advantage in presenting such plans to the public. It would give to those who are and to those who might like to be interested in the Botanic Garden a definite conception of some of the ideals we are aiming at; and I have even cherished the hope that an artistic presentation and wide publication of these plans might operate to bring home to one or more of our public-spirited citizens a civic need and a splendid opportunity to contribute toward "the city beautiful," and to do something personally to advance the cause of public education and culture in Brooklyn.

Needs of the Garden

Provision for Research.—In my preceding report I referred to the great opportunity for leadership that has come to America as

a result of the world war, and added that science in general, and botanical science in particular, share in this opportunity, and that the close of the war should find such institutions as ours with plans matured to meet it. The end of the war came sooner than was then anticipated and, while most scientific and educational institutions have their plans matured, or well under way, in many cases funds are inadequate to carry such plans into effect. Such is the case with the Brooklyn Botanic Garden, and I feel that nothing is now more important for us than to bend every effort to realize these plans, which include the increase as well as the diffusion of a knowledge of plant life. As the vice-president and chairman of the section of zoology of the American Association for the Advancement of Science in his retiring address of 1918 well said:

"We may sometimes discover quite munificent provision for education in a too narrow sense, with little apparent recognition that the subjects covered are still little known or crudely assembled. Extended and careful investigation should be the first effort in order that accurate and useful knowledge may be available for instruction."

The indispensable service rendered by botany and botanists in the world war, and the extent to which the results of research in pure botany found practical application in innumerable ways, ranging from the supply of sphagnum moss for surgical dressings to the larger problems of forestry, agriculture, and food production, has been a revelation not only to the layman, but, in a less degree, to botanists themselves.

But the vital necessity of scientific research is not to be argued solely, nor even chiefly, on the ground that somebody may sometime discover a fact or a principle capable of economic application. The improvement of natural knowledge has always been recognized as an end sufficient in itself, and the importance of organized effort to this end has won increasing recognition since the foundation in 1666 of the Royal Society *for the Improvement of Natural Knowledge*.

The matter could not have been better stated than in the following words of Elihu Root, at the initial meeting of the Advi-

sory Committee on Industrial Research of the National Research Council, held in New York last May:

". . . the real work of organization and research must be done by men who make it the whole business of their lives. It cannot be successful if parceled out among a lot of universities and colleges to be done by teachers however eminent and students however zealous in their leisure hours. The other thing is that while the solution of specific industrial problems and the attainment of specific industrial objects will be of immense value, the whole system will dry up, and fail unless research in pure science be included with its scope. That is the source and the chief source of the vision which incidentally solves the practical problems."

One can hardly overestimate the importance of promoting botanical investigation by the endowment of research positions, and by providing for publishing, disseminating, and popularizing the results of research. I feel that the Brooklyn Botanic Garden is now at a critical stage of its development with reference to this particular work. Steps should be taken as soon as possible for the establishment of several research curatorships, with the necessary assistants and equipment, and provisions for publishing the results of research.

Among the positions that should be created and filled are the following:

1. Curator of plant pathology,
2. Curator of the herbarium,
3. Curator of plant physiology,
4. Curator of soils.

The study of plant pathology would be greatly facilitated if there existed, in this country, a central supply bureau for pure cultures of the organisms (fungi and bacteria) that cause plant diseases. Such centers for organisms causing human disease are now in existence in this and other countries, and have been of very great service. By undertaking a work of this sort the Botanic Garden would not only benefit personally, but would render a valuable service to botanical science throughout the United States. The work could be carried on in connection with a curatorship of bacteriology or of plant diseases. The cost

might appropriately be met from municipal appropriation, but there is little likelihood of this; there is every advantage in having it met from private funds, and preferably in the form of income from endowment. The salaries offered to curators should be sufficient to enable us to command the very best talent available—to meet the salaries of full professorships in our best universities. In other words, an endowment of not less than $500,000 is urgently needed for this purpose; ultimately, the amount should be increased. Our laboratory building was planned with the idea of housing precisely this kind of work. The bulk of the necessary equipment we now have; it remains for us merely to utilize our plant to its full capacity.

Many of the above items were included in Appendix 1 to the Sixth Annual Report of the Garden, for 1916, entitled, "*Aims and a Program for the Second Five Years.*" The plan of development for the first five years of the Garden was accomplished substantially as outlined. Three of the second five years have now passed, but we have not accomplished three fifths of the program.

Material Needs.—Among the innumerable material needs attention should especially be called to the following four:

1. A new, unclimbable iron fence to surround the entire property. We shall never be able to control access to the grounds until this fence is built. Closely connected with this is the matter of suitable entrances, with baffle gates for exit.

2. Permanent stone steps and bridges to replace several temporary wooden structures erected in 1914 and now beginning to deteriorate.

3. Park benches. Attention has been called to this item in preceding reports. The City has declined, for several years, to make an appropriation for this purpose. The urgency of the need may be inferred from the fact that visitors to the Garden, in increasing numbers each season, bring folding chairs as the only alternative to standing or walking.

4. The necessity of providing a plot for a nursery and experimental garden, outside of but readily accessible to the Garden proper, should not be lost sight of. Ultimately such a plot will become absolutely necessary.

Acknowledgments

It is a pleasure to make public acknowledgment, with thanks, to the boys and girls of our 1918 Children's Gardens, for the gift of $36.50, in memory of a deceased member of the Boys' Club, for the support of a French war orphan. Also for four dozen drinking glasses from Mrs. Steves, 274 St. Johns Place, Brooklyn, whose son has, for several years (since he was five years old), been in our children's gardens and other classes for children. On his seventh birthday the son presented the Garden with five dollars to be used, as needed, for our children's room.

A list of gifts received during the year is given in Appendix 2 (p. 81). Grateful acknowledgment is hereby made, with thanks, to the donors of these gifts. The contributions to the annual collections funds were especially welcome in 1918.

The director and members of staff also wish to express here their personal appreciation to the donors of additions to the endowment fund and to the account of special contributions (including salary bonuses), made to the trustees for Botanic Garden purposes. These gifts not only make possible larger and better accomplishement, but are also a stimulus and encouragement to those in immediate charge of the Garden's activities.

Accompanying Papers

The following papers and statements are appended as a part of this report:

1. Annual report of the curator of plants.
2. Annual report of the curator of public instruction.
3. Annual report of the librarian.
4. Financial statements of municipal appropriations and private funds accounts.
5. Appendices 1–5.

Respectfully submitted,

C. Stuart Gager,

Director of the Garden.

Fig. 5. The Rock-Garden. View facing north-west.

REPORT OF THE CURATOR OF PLANTS FOR 1918

DR. C. STUART GAGER, DIRECTOR:

Sir: I take pleasure in submitting herewith my report for the year ending 31 December, 1918.

General Maintenance and Construction Force

The greatest number of men working in this force during the season, which lasted from March 18 to November 22, was 18–19 for three weeks in the spring. During most of the balance of the season 11–17 men were employed, and the total labor days were 3,030 as compared to 2,956 during 1917. This slight increase, however, is apparent rather than real, as, for the first time in the history of the Garden, this force now works eight hours instead of nine. This eight-hour day became effective beginning May 27.

Besides purely maintenance work, this force has accomplished the following during the year: Partial grading of the area between the building and Washington Avenue, uncompleted because war-time conditions made it impossible to get top-soil to finish the job; a good deal of excavation and digging of holes for the planting at and near Malbone Street gate; lawn west of the building on land hitherto occupied by war gardens, put down in October.

In addition to this, general maintenance becomes more pressing each year as new sections of the Garden are put in condition requiring perennial upkeep. Such work is necessary, but not impressive from the point of view of new accomplishment, and is a regular and steady drain on our appropriations for labor. Because the amount of this labor is still insufficient, the grounds have not been kept in the condition which the authorities of the Garden or the public have the right to expect. Not less than eighteen men throughout the season can bring the Garden up to the state in which it can be a real credit to the city. This in addition to extra men in the planting season of spring and fall.

The foreman of this force, Mr. Herman Kolsh, in addition to his other duties, also raised sixty bushels of potatoes as part of

our war garden activities, besides putting in shape for garden plots the children's garden, Museum employees' tract, and some of the area between the Museum and the Reservoir.

Gardening Force

Each year the Garden becomes more and more fit for the purposes for which the institution was started, as new parts of it are graded, top-soiled, and turned over from the laborers to the gardening force. Not only have new parts of the grounds been opened up annually, but existing collections have been increased and additional greenhouse space provided from time to time, the results of which have brought increased pressure upon the gardeners. As an illustration of what this has meant since the beginning of the garden development in 1911, I submit the following *Summary of Gardening Work, 1911–1918*. It shows the

Summary of Gardening Work, 1911–1918

Year	Collections to be Cared for	Number of Gardeners to Care for Them
1911		
	1. Local Flora 2. Morphological Section 3. Economic Section 4. Nursery	1 + part time of 4 laborers
1912		
	1. Local Flora 2. Morphological Section (½ removed to nursery on account of grading)[1] 3. Economic Section[1] 4. *Coniferous Shrubs and Trees*[2] 5. Nursery	2 + whole time of 1 laborer
1913		
	1. Local Flora 2. Coniferous Shrubs and Trees 3. *General Systematic Collection* (*Herbs only*) 4. *Ecological Section* 5. *Conservatories, Houses 1–4* (3 months only)	2 + practically whole time of 2 laborers

[1] Both these collections were wholly removed during 1913 because of grading work; they have not since been restored.

[2] New work for each year is in italic type.

6. *Experimental Garden*
7. Nursery

1914

1. Local Flora
2. Coniferous Shrubs and Trees
3. General Systematic Collection (Herbs and *Woody Plants*)
4. Ecological Section
5. Conservatories, Houses 1–5
6. Experimental Garden
7. *Seed List*
8. Nursery

4 + scattered help from laborers

1915

1. Local Flora
2. Coniferous Shrubs and Trees
3. General Systematic Collection
4. Ecological Section.
5. Conservatories, Houses 1–5
6. *Esplanade Trees*
7. *Japanese Garden*
8. Experimental Garden
9. Seed List
10. Nursery

4 + scattered help from laborers

1916

1. Local Flora
2. Coniferous Shrubs and Trees
3. General Systematic Collection
4. Ecological Section
5. Conservatories, Houses 1–7
6. Esplanade Trees
7. Japanese Garden
8. *Rock Garden*
9. *Hardy Fern Garden*
10. Experimental Garden
11. Seed List
12. Nursery
13. *Lilac Collection*

5 + scattered help from laborers

1917

1. Local Flora
2. Coniferous Shrubs and Trees
3. General Systematic Collection
4. Ecological Section

5. *Conservatories, Houses 1–12 + Instruction, Propagation and Research Houses (18 in all)*	
6. Esplanade Trees	3 full time,
7. Japanese Garden	4 part time
8. Rock Garden	
9. Hardy Fern Garden	
10. *Iris Garden*	
11. Experimental Garden	
12. Seed List	
13. Nursery	
14. Lilac Collection	

1918

1. Local Flora	
2. Coniferous Shrubs and Trees	
3. General Systematic Collection	
4. Ecological Section (Completely revised and relabelled in 1918)	1 full time,
5. Conservatories (Complete as shown Brooklyn Botanic Garden RECORD 8 : 60)	1 for 8 months,
6. Esplanade Trees	3 for 7 months,
7. Japanese Garden	2 for 5 months,
8. Rock Garden	1 for 4 months,
9. Hardy Fern Garden	1 for 2 months,
10. Iris Garden	1 for 1 month.
11. *Malbone Street Gate Planting* (about ⅓ installed)	This is nearly equivalent to 5 men's time, but less satisfactory.
12. Experimental Garden	
13. Seed List	
14. Nursery	
15. Lilac Collection	

collections opened up and the number of gardeners available for taking care of them during each year, not counting the head gardener, whose time is mostly taken up with supervision of the work. It does not, also, take into consideration the children's garden, which is cared for by a gardener under the department of public instruction. Neither has care of trees already in the grounds nor the border mound planting been figured, as they comprise planting that did not initiate with us. Most of the border mound planting, and all the larger trees were planted some years before we took control of the grounds. The summary,

then, shows only collections actually started by us. It is interesting as a record of accomplishment, but particularly significant with your prospectus in the *First Annual Report of the Garden* (RECORD, April, 1912) in mind.

The foregoing emphasizes also what has become obvious for some time past, the inadequate number of gardeners to keep our collections in proper condition. Until that situation can be very materially improved, I would suggest that no new collections be opened up, but that all our time and effort go to existing ones, their replacement, improvement and general upkeep. It would seem better to have what collections are already installed kept in first-rate condition rather than diffuse our efforts and get decidedly second-rate results. Of course, the poor service from gardeners during the year 1918 was due to the draft, and during 1919 the condition should become easier, but seven full time, experienced gardeners should be our minimum. Some of those in the above schedule now classed as gardeners are so classified for administrative rather than professional reasons.

Actual new work done during the year comprised about one third of the decorative planting at the Malbone Street gate. This is mostly a broad-leaved evergreen group with a ground-cover of *Arctostaphylos Uva-Ursi* now, for the first time, thoroughly established at the Garden.

There has been a good deal of replacement work. The esplanade trees, originally flowering dogwood which proved unsatisfactory, were replaced by specimens of Schwedler's Maple, 80 in all. Thousands of plants were added to groups along the wild-flower path, but here one lot of 500 *Trillium grandiflorum,* just in full bloom, was more than half destroyed by vandals.

To make room for the general systematic collection, the old nursery has been shifted from an area near the original southern boundary of the Garden to north of the laboratory building, and certain of the cold frames from there to the service yard. Over fifty birch trees on the place were cut down because of the ravages of the birch tree borer, and subsequent decay. From such a cause this has been our most serious loss. I have already reported in the RECORD for July the loss to our collections of woody plants due to the extremely severe winter 1917–1918.

There have been considerable additions to existing collections, notably among the Iris Garden and Japanese Garden, the latter under the supervision of Miss Averill.

The greenhouse collections have suffered from shortage of coal which necessitated closing up more than half of the houses and crowding the plants into the remainder. While few died as a result of the crowding, the collection is by no means in the condition it was during 1917. The houses have been closed to the public since January 10, 1918. During warm weather the

FIG. 6. Mossy Saxifrage (*S. caespitosa*) in the rock-garden.

plants were shifted back to their old positions, crowded together again in October, and put again in their permanent places in December preparatory to opening the houses to the public early in 1919.

For the first time in the history of the Garden we staged an exhibition at the Spring Flower Show at Grand Central Palace.

This consisted of greenhouse plants rare or otherwise interesting. It aroused favorable comment because the plants were all distinctly labelled, and because most of the plants shown were unknown to the general public.

Mr. Montague Free, who has been in immediate charge of the men in this force, besides giving many talks, demonstrations, etc., in connection with war garden work, has visited 37 war gardens in Brooklyn, as against 139 during 1917.

As before, he has superintended the collection of seeds and preparation of the seed list, this year issued as a supplement to the 1916 collections. In all, 1,980 packages of seed were distributed, and 697 received as an exchange from other institutions.

Labelling and Other Clerical Work

Beginning in 1918, loose-leaf lists have been adopted instead of a card catalog. Individual accession numbers have been replaced by consignment numbers as the plants are received. Numbers 18–1 to 18–48 were assigned during 1918, the first figure representing the year. Dr. Alfred Gundersen, who devised the new system, has also made location maps for out-door herbaceous and woody plants in the garden so that records on the labels are now for the first time thoroughly safeguarded. The number of labels pulled up each year has been a discouraging feature of the administration of the grounds, and these maps help materially in accurately repairing such vandalism. During the year 622 show labels were made by the labelling department.

Gifts to the collection of living plants during the year are as follows: Miss Agnes V. Luther (1 plant and 100 bulbs of *Iris Hispanica* var. *Baroness von Humboldt*); Miss Louise Doremus (7); Isaac Hicks & Son (15); H. C. Foster, Esq. (1); Alfred T. White, Esq. (4); Mrs. Alfred T. White (1); George P. Engelhardt, Esq. (1); A. E. Hyde, Esq. (1); Mrs. J. Sanford (1); Miss Maud Purdy (1); Miss Ellen Eddy Shaw (2); Mr. Sanborn (1); Dr. H. B. Shaw (1); Mrs. Benjamin Prince (44); K. Strahan, Esq. (1); T. L. Van Norden, Esq. (1); Miss R. N. Reeves (1), and Professor T. D. A. Cockerell (6).

Phanerogamic Herbarium

An estimate of the number of specimens in the collection, counting flowering plants, ferns and fern allies only, based on actual counts of many pigeonholes in the herbarium and averaging the balance, shows the following:

Long Island specimens, which were kept separate, about...	12,000
General Herbarium	66,500
Cultivated Herbarium, which is kept separate.....	3,100
	81,600

The chief additions, beyond my own collections on Long Island, Slide Mountain and at Mt. Washington, were as follows: Roland M. Harper—57 specimens from Long Island as a gift; Canton Christian College—638 specimens from China, purchased; Walter Fischer—284 specimens from the Argentine, purchased; C. A. Schwarze—78 specimens of Hadsted's North American Weeds as a gift; Miss Daisy Levy—800 miscellaneous specimens as a gift. During the year 2,417 specimens were mounted and these are included in the count of the collections summarized above.

Personal Activities

A visit, for the first time, to Gardiner's Island, during my field work on Long Island shows that any account of the vegetation of Long Island will be incomplete without further study of it. This unique island, large parts of which have been undisturbed since about 1650, has such primeval forests upon it that without careful study of them one can get no true idea of the vegetation or its development on Long Island. At least one more season's work at the eastern end of Long Island is, therefore, necessary before the volume on the vegetation of Long Island can be ready for the press.

Collections during the season of 1918 at the summit of Mt. Washington and the Slide Mountain in the Catskills, have suggested a continuation of such collections, with the addition of Mt. Marcy in the Adirondacks. The correlation of these studies with problems in ecology, and with the advantage of collecting

FIG. 7. Classes from a public school assembling for an illustrated lecture, to be followed by a visit to the conservatories and plantations. (War-gardens in front of the building.)

living plants for the Rock Garden and specimens for the herbarium seem to warrant the continuation of trips such as I here propose.

The identification of specimens has not been as heavy as during past years, totalling probably not over 400 specimens. My outside activities have been the same as in 1917.

Respectfully submitted,

NORMAN TAYLOR,
Curator of Plants.

REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1918

DR. C. STUART GAGER, DIRECTOR.

Sir: I have the honor to submit herewith my report as curator of public instruction for the year ending December 31, 1918.

Courses of Instruction

As heretofore, the courses of instruction offered at the Garden were divided into four groups, as follows:

A. Gardening and nature study courses for children (7 (courses) and for teachers (4 courses).

B. A group of 11 courses in Children's Gardening, designed especially for those who wish to qualify as teachers in the subject.

C. Courses specially adapted for the general public.

D. Courses in pure and applied botany and in botanical investigation.

Owing in part to adverse conditions imposed by the war, and in part to a change in plan, providing for intensive rather than extensive work, the registration in these courses, mostly in group *A*, fell somewhat below the number of last year. However, 3,386 were recorded, with a total attendance at the Garden of 24,483. Adding to this the 4,381 visiting pupils who came to the Garden for special work or lectures by Miss Shaw and Miss Cross, as well as the 10,000 more or less in attendance at various lectures and talks given outside the Garden by the staff during the year, we may conservatively estimate that at least 40,000

people were more or less directly reached by the divers kinds of educational work undertaken by the Garden.

The following table shows the attendance at the Garden by months and the annual totals.

TABLE I

ATTENDANCE DURING 1918

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
At the Garden							
Regular classes	101	126	971	1,075	3,022	3,140	3,840
Visiting classes				698	1,240	960	35
Lectures to children							
Lectures to adults			746	458	180	100	70
Conservatories			Closed to public				
Total registration at gates	24,500	23,408	29,174	38,304	52,723	48,461	43,046
At addresses at schools, clubs, etc.		264	1,630	3,180	1,334	800	700

	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Totals.
At the Garden						
Regular classes	3,710	3,354	3,413	928	803	24,483
Visiting classes	35	103	864	408	98	4,381
Lectures to children		425	300	326	40	1,091
Lectures to adults	35		300	125		2,014
Conservatories			Closed to public			
Total registration at gates	31,403	37,143	30,970	28,286	11,578	398,966
At addresses at schools, clubs, etc.	40	90	275	1,000	250	9,563

As last year, the emphasis of the most of our work and teaching was on war gardens and other activities related more or less to food supply and food conservation. The work particularly of Miss Shaw and Miss Cross and their group of teachers in training was directed primarily toward increasing the local food supply, both in the plots at the Gardens, as well as in many home gardens throughout the city. Mr. Free, our head gardener, also contributed much toward this end by his expert advice on soil conditions, questions concerning fertilizers, cropping, harvesting, etc. The report of Miss Shaw on certain details of this work is incorporated as a part of this report.

Mr. Free's course of six lectures on "Vegetable Gardening," given on Sunday afternoons and Wednesday evenings during March, proved a quite popular attraction, the attendance at one of these meetings numbering 263.

As a fitting emphasis on just the sort of work which the Garden has been doing along gardening lines, I will quote from President Emeritus Eliot, of Harvard University, in an address on "Defects in American Education Revealed by the War," delivered before the League for Political Education, as printed in the New York *Times* of November 24, 1918: "The war has also placed in a clear light the need all over the world of a more productive agriculture, and has shown how that need may be satisfied through giving instruction to children and adults in the means of increasing agricultural productiveness through the study of soils, seeds, food plants, domestic animals, and the best means of cultivating and improving the soil. It follows that the teaching of agricultural science and art should be an important feature in the education of every child in both the urban and the rural population. Fortunately, the agricultural arts afford admirable means of training children and adults to accurate seeing and recording and then to sound reasoning on the records made."

Another popular series of Garden lectures were the nine War-the-War lectures given during April and May. The following were the subjects and lectures in this spring course:

April 3 and April 7. *Farming for Women.*

Miss Sophia de M. Carey, official lecturer of the British Government.

Miss Elizabeth Cleveland and Mrs. Florence Young, Bedford Farmerettes and members of the Woman's Land Army of America.

April 14. *The Back Yard Vegetable Garden.*

Miss Jean A. Cross, Assistant Curator of Elementary Instruction.

April 21. *Forest Products and the War.* (*Arbor Day Lecture.*)

Prof. Samuel J. Record, School of Forestry, Yale University.

April 28. *Diseases of Garden Crops and How to Control Them.*

Dr. Edgar W. Olive, Curator of Public Instruction.

May 5. *Plant Breeding and Increased Food Production.*
Dr. Orland E. White, Curator of Plant Breeding.
May 12. *Bacteriology and the War.*
Dr. Ira S. Wile, former member of the Board of Education, New York City.
May 19. *Garden Insects—Good and Bad.*
Dr. E. P. Felt, State Entomologist of New York.
May 26. *Cultivation of Drug Plants.*
Dr. W. W. Stockberger, in charge of drug and poisonous plant investigations, U. S. Department of Agriculture.

In that phase of our elementary teaching done by Mr. Stoll, over 1,700 Boy Scouts were taught concerning trees or similar nature study subjects. This teaching was done for the most part on Sundays, evenings, and during vacation time, in addition to Mr. Stoll's regular duties as custodian and registrar. Besides thus helping troops of Boy Scouts throughout the city to acquire certain nature study information in which it is necessary for them to be proficient, Mr. Stoll has done much similar work during his vacation at the Boy Scout camps and Scout Master's School at the Palisades Interstate Park.

Cooperation with Schools, etc.

Talks at Schools.—Fifty-five talks and addresses were given during the year at various schools, clubs, etc., by members of the Garden staff, with an attendance of about 10,000.

Study and Loan Material.—Petri dishes, used by the teachers in connection with the study of hygiene, were filled with nutrient material for the following High Schools: Girls', Bay Ridge, Eastern District, Manual Training, and Erasmus Hall. Study material of various kinds was also given on request to several High Schools and Colleges throughout the city.

Cryptogamic Herbarium

The following accessions were made to the cryptogamic herbarium during 1918:

Fungi, by gift from Mr. C. A. Schwarze, U. S. Dept. of Agriculture..	45
Fungi and lichens, by exchange with Prof. W. G. Farlow, of Harvard University	221

Fungi, by exchange with Prof. John A. Stevenson, collected in Porto Rico	134
Fungi, by exchange with Prof. E. W. D. Holway, of the University of Minnesota	301
Fungi, by exchange with Dr. James R. Weir, Pathologist at the Laboratory of Forest Pathology of the United States Department of Agriculture at Missoula, Montana	270
Fungi, by purchase	459
Fungi, by collection by George M. Reed, while resident investigator at the Garden	366
Algae, by gifts from Mr. F. C. Stechert, of New York	89
Lichens, mosses and liverworts by gift from Mrs. Annie Morrill Smith, of Brooklyn	15
Total	1,900

Editorial and Research Work

Owing to paper shortage and general adverse conditions only eight numbers of the *Leaflets* were issued during the year, against the usual fourteen numbers; two of these were, however, of double size. With one or two exceptions, these were written on subjects having to do more or less directly with war-gardens. The *American Journal of Botany*, also published by the Garden in cooperation with the Botanical Society of America, has, with the ending of 1918, completed its fifth year, fulfilling an important function in the botanical world.

As reported in the RECORD for October, 1918, I spent my summer vacation in plant disease work in New York, Virginia and Pennsylvania for the Plant Disease Survey and Cereal Disease offices of the United States Department of Agriculture, cooperating with the Departments of Plant Pathology at Cornell and at the Virginia Polytechnic Institute, and with the Pennsylvania State Department of Agriculture. In addition to the work there recorded, I assisted in the work on the new and serious disease of Potato Wart, recently discovered in the gardens of many of the anthracite coal miners around Hazleton, Pennsylvania.

Respectfully submitted,

EDGAR W. OLIVE,
Curator of Public Instruction.

FIG. 8. War-gardens, cultivated by older boys and girls.

Report on Elementary Instruction, 1918

By Ellen Eddy Shaw

"Win-the-War Gardens" has been the slogan about which we have rallied our forces this past year. During the spring many lectures on this subject were given, classes were formed, and garden plots inspected, all for war garden work. Forty-six war garden plots were thus inspected. Sixteen schools requested lectures on war gardens, and over 20,000 children were reached in this way. Six clubs, embracing 2,000 people, were spoken to; and at five evening meetings, under the auspices of the Lecture Department of the New York City Board of Education, these "Win-the-War" lectures were given. Two colleges, Vassar and Wellesley, were visited in the interest of our Teachers' Garden Course, looking to the attracting of young women to this work.

Very interesting things came out of this intensive campaign. I would mention among these the formation of the Erasmus Hall Garden Club, of twenty-five boys and girls and two teachers of the high school, who were much interested in war gardens, and who met every second Wednesday during the spring and fall at the Botanic Garden. These students had plots in our outdoor garden, 10 ft. by 20 ft. in size, cultivated with the idea of obtaining as much crop as possible from that limited space.

Another group of twenty boys and girls from Public School 89 gave up a regular school play-period to come to the Botanic Garden and learn the principles of gardening. These children organized their little club, came by themselves, and paid their own small fees.

These two examples suggest many new possibilities of usefulness of this Garden; needs which other institutions of this nature in the city, save one, could not possibly fill.

The Erasmus Hall Garden Club, besides gardening here on the Botanic Garden grounds, also took a plot of land opposite Erasmus Hall and carried on a war garden there. This garden was under our supervision for the month of August, while the teachers connected with the Club were absent on their vacations.

In view of the urgent need for better and more profitable

gardens this year than ever before, the regular lectures for public schools were set aside this spring; and in their place a subject was chosen on "How to plant a small garden," and demonstrations of actual planting were given on an outdoor plot. A letter was sent to fifty-eight public schools, inviting each school to send forty children, or one grade, to this lecture and demonstration. Out of the fifty-eight, forty-one schools responded, and 1,730 boys and girls were taught how to plant a small garden in their own back yards, and how to plant different kinds of seeds. The schools concerned chose especially those boys and girls who had back yards, so that the 1,730 boys and girls represented 1,730 actual gardens. The same course will be pursued during the coming spring.

This method resulted in a smaller attendance at these lectures than our usual attendance would have been, but at the same time specific and more definite help was given to each individual. The attendance at both spring and fall courses was only 5,000, against approximately 10,000 of last year; but, as stated above, this 5,000 represents, for the most part, specific individual help, while the 10,000 may represent this or may not.

We have the direct testimony of one of the public schools that our cooperative garden work resulted in more and better gardens in the vicinity of that school. Such a tribute, unsolicited, is the best kind of evidence of the value of our work, and of the appreciation with which it is received.

There were 3,386 boys and girls in our regular garden courses. These are the courses which extend over a period of time from six weeks to six months in length. The attendance at these regular classes was 24,483. These 3,386 boys and girls received personal and individual attention. We might handle superficially many times this number of boys and girls during the year, but the result would be quite different than in the present case. We are working toward good, concrete garden work which promotes independence and individuality, and consequently goes back home; and we are also working toward good citizenship, which is better built up by individual work than by working with large groups and masses.

During the past summer 409 boys and girls were registered in

our outdoor gardens. Some boys and girls had more than one plot, the second plot representing larger areas for the raising of beans, corn, etc. We have two sizes of plots, the majority being plots 8 ft. by 10 ft.; and larger ones, 10 ft. by 20 ft.; in addition to this certain corn and bean areas consisted of irregular plots of much larger size. A total of $4,820.13 worth of crops was taken out of the children's gardens during the season of 1918; making an average yield per plot of $15.34. But this average is not truly representative, since the plots vary in size. The average yield from one 8 ft. by 10 ft. was approximately $10; while that from a 10 ft. by 20 ft. plot was about $20. Some plots were worked by more than one child, as in the case of a large corn patch cultivated by twenty-four boys and girls.

The following fact might be of interest: fifty-six schools in all were represented in our garden work. Of this number six were high schools, eleven were parochial schools, and four were private schools; the thirty-five remaining being elementary public schools. It has been our aim to have represented in our garden a few boys and girls from as many schools as possible, rather than a large number of boys and girls from any one school; thus making the influence of the Botanic Garden felt widely over the entire city.

As usual, penny packets of seeds were sold to the boys and girls of the city, but because of the high price of seed, the price had to be raised to two cents per packet, and about 94,000 packets were sold, not as many as in the past year. This is accounted for by the higher price of the packets and by increased family expenses, which made the buying of seed a matter of some concern even at two cents a packet. It is probable, however, that at two cents a packet a larger percentage of the seeds found their way into well tended gardens than would have been the case at one cent a package.

Our summer school, with an enrollment of five members, a smaller number than we have had for some years, was perhaps the most interesting one in the history of this Garden. Four of the members were high school teachers in this Borough, and were particularly interested in the application of garden work to high school botany. This demand determined the special trend of our

summer school work. On November 23, eight young women received certificates from the Teachers' Garden Course. Dr. Maurice A. Bigelow, dean of Teachers' College, Columbia Uni-

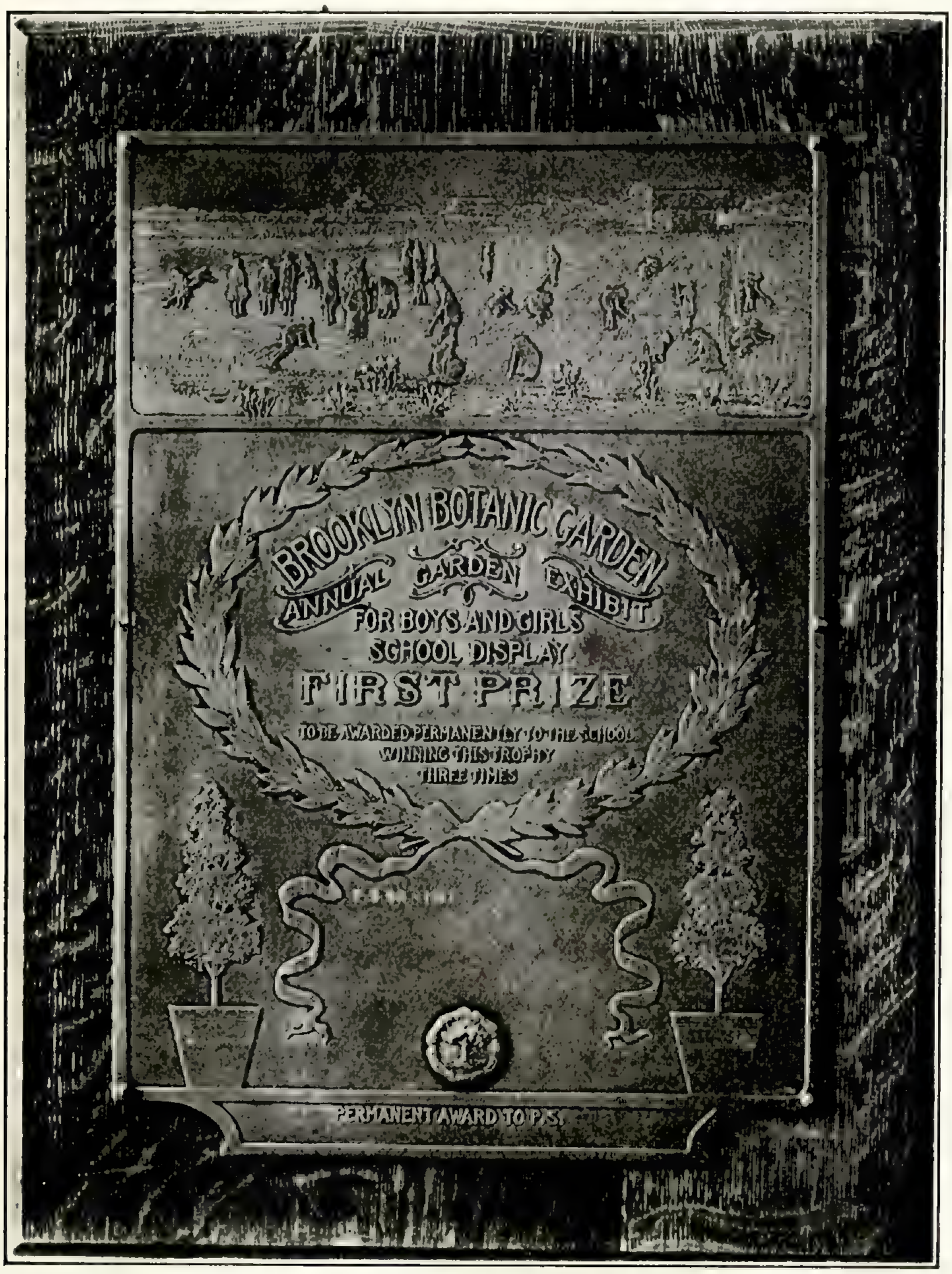

FIG. 9. Bronze trophy awarded annually to the school having the best display at the annual children's garden exhibit.

versity, gave the address at the exercises held on this occasion.

The regular work of the department of elementary instruction has gone on as usual, and the only new features of our work this

year have been the win-the-war garden campaign, which was carried on, as stated before, in our school lectures; and the rather different phase of garden work as pursued in the summer school.

Personal Activities

As during the past three years, I have acted as editor of The National Plant, Flower and Fruit Guild *Magazine*. The course in nature study at the Froebel League, New York City, has been under my supervision. A course of five lectures in gardening was given at the Froebel League in March and April. This course was given so that the parents' organizations and mothers' clubs in that school might have a course under the patronage of Froebel League.

REPORT OF THE LIBRARIAN FOR 1918

DR. C. STUART GAGER, DIRECTOR.

Sir: I have the honor to submit herewith my report as librarian for the year ending December 31, 1918.

The work in the library for the past year has not differed greatly from the two preceding years, except that there has been a greater amount of routine work for the librarian. This was partly due to the necessary preparation of bindery books for the shelves, partly to the Florida Agricultural Experiment Station gift of 5,833 parts of publications which was incorporated with our collection, and also to lack of assistance. However, we are glad to report a definite amount of progress, not only in the acquisition of publications and in the systematizing of routine work, but in the physical equipment of the library. With the installation of a successful lighting system, the library becomes a comfortable reading room, and the map case will keep intact both our maps and plates.

Attention may also be called to the case of shelves set apart for "Recent Accessions," which has proved of practical value to the staff. Heretofore, publications newly acquired were, as soon as prepared for use, shelved in their proper places. For

the past year, however, we have set this case apart for fresh accessions, so that the staff may have an opportunity of examining them.

Accessions

Among the accessions secured by purchase or exchange may be mentioned *The American Monthly Microscopical Journal,* 12 volumes; *The Monthly Microscopical Journal,* 18 volumes; *Botanische Zeitung,* 18 volumes; *Journal of the Elisha Mitchell Scientific Society,* 11 volumes; *Philadelphia Academy of Natural Sciences,* 11 volumes; *Revue Horticole,* v. 59–82; *Sitzungsberichte der Mathematisch-Naturwissenschaftlichen Klasse der K. Akademie der Wissenschaften,* Wien, v. 93–112.

Of unique interest, in an historical sense, are John Gerarde's "Herball" (1633), and "Nova Plantarum Genera" by Petro Antonio Micheli (1729), both secured by purchase; the three volumes of Johanne Bauhin's "Historia Plantarum Universalis" (1640), presented by Mr. Alfred T. White; and John Parkinson's "Theatrum Botanicum," donated by Mrs. Joseph Epês Brown. The Parkinson is a complete and perfect copy of the first edition, London, 1640, having engraved title page, and page of *Errata* at the end.

Included in Mrs. Brown's gift were 23 volumes of the "Flores des Serres et des Jardins de L'Europe," and "Orchidaceae of Mexico and Guatemala," by John Bateman. The latter book is a royal quarto, containing 40 colored plates. The preface is dated 1843, and only 125 copies were issued.

We gratefully acknowledge Mrs. Annie Morrill Smith's gift of 50 photographs of botanists, authors' original drawings of published papers on hepatics, mosses and lichens, autograph letters of botanists and valuable manuscripts and correspondence.

Our collection now numbers 5,578 volumes and 7,681 pamphlets, a total of 13,259, not including current numbers of serial publications. The total number of parts added to the library during the past year is 4,131, as compared with 11,196 for 1917. The large figure for 1917, however, is due to the 5,833 parts presented to us by the Florida Agricultural Experiment Station.

Periodicals

Thirty-seven new titles have been added to the serial collection currently received. Among these may be mentioned: *Journal of the American Peat Society; Publications of the Graduate School of Tropical Agriculture and Citrus Experiment Station of the University of California; Journal of the Elisha Mitchell Society; The Garden* (London); *Journal of the Horticultural Society of New York; Iowa Conservation; Contributions of the Department of Botany of Iowa State College; Journal of the Linnean Society; Quarterly Bulletin of the Michigan Agricultural College; Science Progress; Memorias de la Sociedad Cubana de Historia Natural, Felipe Poey; West Indian Bulletin.*

Due to the efforts of Dr. M. L. Raney, secretary of the American Library Association, Committee on Importations, in cooperation with the State Department at Washington, the library received from Holland the following German periodicals for 1918: *Beihefte zum Botanischen Centralblatt; Berichte der Deutschen Botanischen Gesellschaft; Flora; Jahrbücher für Wisseneschaftliche Botanik; Zeitschrift für Botanik; Zeitschrift für Induktive Abstammungs- und Vererbungslehre; Zeitschrift für Pflanzenkrankheiten; Zeitschrift für Pflanzenzüchtung.*

Library Assistants

The library has had its vicissitudes in attempting to secure an assistant. On March 1, 1918, Miss Ruth Taylor was appointed, but resigned on account of ill health. Two inexperienced high school students were then tried, Miss Johanna Boehling and Miss Jennie Gilligan, each giving full time alternate weeks, beginning with the latter part of April, 1918, until the completion of the school term. Miss Gilligan resigned September 1, 1918, to enter a more remunerative position. The librarian then remained without assistance until the early part of December, when Mrs. Burdick once more gave two hours each afternoon, typing catalog cards, preparing books for the shelves and helping with routine work in general. Miss Meyer typewrites pamphlet cards, cuts pages, etc., whenever possible, in addition to her correspondence work for the library.

Loans

The usual collection of books was forwarded to the Biological Laboratory, Cold Spring Harbor, for the summer school. Publications were also loaned to the Brooklyn Museum and the Municipal Reference Library, New York.

Our library gratefully acknowledges the loan of several books during the year from the Brooklyn Museum.

Summary

In addition to the usual routine of preparing publications for use, filing cards currently received, reshelving to make room for new accessions, we list below the special work the library has had in hand:

The Florida Agricultural Experiment Station gift of 5,833 parts of publications was incorporated with our experiment station literature.

The inclusive numbers of annual reports, bulletins, circulars, of agricultural experiment stations are now noted on the back of each folder, so that one knows at a glance, without the necessity of opening the folder, which publication the library possesses.

About 400 publications from the binder were made ready for use.

The various gifts of the year, in all 199 volumes, 177 pamphlets, and 1,655 parts, were prepared for the shelves.

Two thousand nine hundred and twenty-seven experiment station index cards were re-arranged, thus completing the task of arranging this catalog according to the "Key to subject index of experiment station literature."

The 122 volumes of *Curtis' Botanical Magazine* were labelled, each volume now showing its inclusive plate numbers, thus facilitating the use of this valuable reference work.

Fresh labels were typewritten for the current periodical table, the shelves containing the experiment station literature, and new labels with Willson's gummed letters were inserted for library stacks.

The cataloging of serials is progressing though not as quickly as one would wish.

The New York Library Club held its October meeting at the Garden. This was the first time a library association has met at our institution, and while the meeting was especially arranged to show the outdoor features, an hour was nevertheless devoted to brief talks by Dr. C. S. Gager and Miss Ellen Eddy Shaw on the various activities in which the Garden is engaged. The librarian gave a brief résumé of the collection in the library, and the different classes of readers who make use of it.

The librarian lectured before the senior class of the Library School of the New York Public Library on "Problems of a Botanical Library," on June 4, 1918.

The Library was represented during 1918 at the meetings of the New York Library Club and the New York Special Libraries.

Needs

The library has now become much too large, is growing too rapidly and is too widely used to be adequately served by one person. To the exclusion of more important matters, the librarian's time is now largely consumed with details that could well be cared for by an assistant.

The binding of old and shabby books and of completed volumes of periodicals would make the collection more valuable to the staff.

If at all possible book stacks for the balcony should be installed at the earliest convenient date so that another year's accessions will not crowd the library to such an extent as to impair its usefulness by compelling us to shelve volumes where they will not be readily accessible.

For list of donors and gifts see Appendix 2 (p. 81). The statistical report follows.

STATISTICAL REPORT ON THE LIBRARY

Accessions

	Volumes	Pamphlets	Parts (including Periodicals)
Exchange	58	109	1,872
Gift	199	177	1,655
Publication	1	69	190
Purchase	309	29	404
Bindery	242	0	0
Deposit	0	0	10
	809	384	4,131

Total number of parts added to library in 1918, including current periodicals	4,131
Total number of volumes in library December 31, 1917	4,769
Total number of volumes added during 1918	809
Total number of volumes in library December 31, 1918	5,578
Total number of pamphlets in library December 31, 1917	7,297
Total number of pamphlets added during 1918	384
Total number of pamphlets in library December 31, 1918	7,681
Total number of volumes and pamphlets in library December 31, 1917	13,259
Total number of volumes and pamphlets added during 1918	12,066
Increase in number of volumes and pamphlets	1,193

Serial Publications

Count of periodicals, state and federal documents, and society publications currently received during 1918:	
Subscription	40
Gift	39
Exchange	257
Deposit from Brooklyn Public Library	2
Publication	5
Total	343
Increase	37

Miscellaneous Statistics

Index cards of the U. S. experiment stations on file in the library, December 31, 1917	6,670
Experiment station index cards added by purchase during 1918	129
Total number of experiment stations index cards on file in the library, December 31, 1918	6,799

Torrey Botanical Club index cards on file in the library, December 31, 1917	25,364
Torrey Botanical Club index cards added by purchase during 1918	1,146
Total number of Torrey Botanical Club index cards on file December 31, 1918	26,510
Index Algarum Universalis cards, December 31, 1917	8,081
Added by purchase during 1918	1,818
Total, Index Algarum Universalis cards, December 31, 1918	9,899
Cards added to shelf list	247
Cards added to serial shelf list	269
Cards added to dictionary catalog	1,345
Cards added to pamphlet catalog	375
Cards added to current periodical catalog	50
Cards added to catalog of duplicates	77
Typewritten cards, total	2,363
Books loaned to members of staff	382
Number of readers in library, approximately	1,167
Volumes entered in accession book	778
Number of letters written	282
Books loaned to other institutions	15
Books borrowed from other institutions	4
Lantern slides on file December 31, 1917	1,922
Lantern slides accessioned during 1918	399
Total number of lantern slides on file December 31, 1918	2,321
Photographic negatives on file December 31, 1917	2,624
Negatives accessioned during 1918	393
Total number of negatives on file December 31, 1918	3,017

Respectfully submitted,

RAY SIMPSON,
Librarian.

FINANCIAL STATEMENTS FOR 1918

1. MUNICIPAL ACCOUNT

1360 *Personal Service:*

Appropriation	$42,310.00
Contributed from Private Funds	3,810.80
	46,120.80
Expended	46,120.80

1361	*Supplies:*		
	Appropriation		$ 7,451.00
	Expended	$7,291.17	
	Transferred to 1363	159.83	7,451.00
1362	*Equipment:*		
	Appropriation		$ 848.00
	Expended	$835.21	
	Transferred to 1363	12.79	848.00
1363	*Materials:*		
	Appropriation		$ 500.00
	Transferred from 1361	$159.83	
	Transferred from 1362	12.79	
	Transferred from 1364	62.72	
	Contributed from Private Funds	187.95	423.29
			$ 923.29
	Expended		923.29
1364	*Repairs and Replacements:*		
	Appropriation		$ 500.00
	Contributed from Private Funds		1,379.25
			$ 1,879.25
	Expended	$1,809.60	
	Transferred to 1363	62.72	
	Transferred to 1365	6.93	1,879.25
1365	*Light, Heat and Power:*		
	Appropriation		$ 150.00
	Transferred from 1364	$ 6.93	
	Transferred from 1368	4.44	11.37
			$ 161.37
	Expended		161.37
1366	*Transportation:*		
	Appropriation		$ 720.00
	Transferred from 1368	$30.90	
	Transferred from 1369	6.70	37.60
			$ 757.60
	Expended		757.60
1368	*Telephone Service:*		
	Appropriation		$ 150.00
	Expended	$114.66	
	Transferred to 1365	$ 4.44	
	Transferred to 1366–C	30.90	35.34 150.00

1369 *General Plant Service:*

Appropriation			$ 450.00
Expended		$366.23	
Transferred to 1366–C	$ 6.70		
Transferred to 1370	77.07	83.77	450.00

1370 *Contingencies:*

Appropriation			$ 150.00
Transferred from 1369		$77.07	
Contributed from Private Funds		37.74	114.81
			$ 264.81
Expended			264.81

Summary of Municipal Accounts:

Appropriation by City for maintenance		$53,229.00
Contributed from Private Funds		5,415.74
		$58,644.74
Expended		58,644.74

2. Private Funds Accounts for 1918

1. *Endowment Fund, Income:*

Income, 1918		$ 3,900.00
Contributed to City Accounts	$ 14.12	
Expended	1,351.62	1,365.74
Balance, December 31, 1918		$ 2,534.26

2. *Botanic Garden Collections, 1918:*

Received, 1918		10,739.00
Transferred from Collections (1917) Account, balance		.08
Refund from express company for slides broken in transit		8.10
		$10,747.18
Transferred to Special Contributions	$8,137.09	
Expended	2,507.31	10,644.40
Balance, December 31, 1918		$ 102.78

3. *Special Contributions:*

Refunds on 1917 accounts		$ 836.80
Contributed by A. T. White, for prizes		262.88
Transferred from Collections (1918) Account		8,137.09
		$ 9,236.77
Expended	$3,835.15	
Contributed to Maintenance accounts	5,401.62	9,236.77

4. *Cary Library Fund, Income:*

Balance, January 1, 1918		$ 2.36
Income, 1918		100.00
		$ 102.36
Expended		47.49
Balance, December 31, 1918		$ 54.87

5. *George C. Brackett Library Fund, Income:*

Balance, January 1, 1918		$ 28.35
Income, 1918		25.00
		$ 53.35
Expended		9.57
Balance, December 31, 1918		$ 43.78

6. *Sustaining Membership:*

Balance, January 1, 1918		105.58
Received, 1918		405.25
		$ 510.83
Expended		43.10
Balance, December 31, 1918		$ 467.73

7. *Annual Membership:*

Balance, January 1, 1918		380.97
Received, 1918		710.00
		$ 1,090.97
Expended		1,049.86
Balance, December 31, 1918		$ 41.11

8. *Tuition and Sales:*

Balance, January 1, 1918		827.29
Received, 1918:		
(a) Tuitions	$ 361.76	
(b) Penny seed-packets	1,891.39	
(c) Incidentals	193.49	2,446.64
		$ 3,273.93
Expended, 1918:		
(a) Tuitions (postage, printing, etc.)	$ 946.79	
(b) Penny seed-packets	983.05	
(c) Incidentals	208.75	2,138.59
Balance, December 31, 1918		$ 1,135.34

9. *Benjamin Stuart Gager Memorial Fund, Income:*

Income, 1918	400.50
Expended	0.00
Balance, December 31, 1918	$ 400.50

10. *Martha Woodward Stutzer Memorial Fund, Income:*		
Income, 1918		31.25
Expended		0.00
Balance, December 31, 1918		$ 31.25
11. *Special Fund:*		
Income, 1918		5,826.41
Expended		0.00
Balance, December 31, 1918		$ 5,826.41
Summary of Private Funds Accounts:		
Balance, January 1, 1918		$ 1,344.55
Income, 1918		25,691.91
		$27,036.46
Contributed to maintenance accounts	$ 5,415.74	
Expended	10,982.69	16,398.43
Balance, December 31, 1918		$10,638.03

APPROPRIATIONS OF CORPORATE STOCK OF THE CITY OF NEW YORK FOR PERMANENT IMPROVEMENTS, AND EXPENDITURES THEREFROM DURING 1918

C.D.P. 200-M. (*$100,000.00*) *For Improvement of the Brooklyn Botanic Garden*

Balance, January 1, 1918	$1,422.13
Expended	1,311.62
Balance, December 31, 1918	$ 110.51

S.-566, (*$100,000.00*) *Suspense Account, Contributions for Brooklyn Botanic Garden Improvement Fund*

Balance, January 1, 1918	$1,845.94
Expended	1,598.12
Balance, December 31, 1918	$ 247.82

APPENDIX 1

ADDITION TO THE ENDOWMENT FUND

On June 3, 1918, the Treasurer of the Institute received from a friend of the Garden a letter of gift, from two anonymous donors, containing certificates of stock of the par value of $10,000 to be added to the Endowment Fund of the Brooklyn

Botanic Garden, the income to be expended in connection with its scientific and educational work. The letter was in part as follows:

TREASURER, BROOKLYN INSTITUTE OF ARTS AND SCIENCES,
Academy of Music Building,
Lafayette Ave., Brooklyn, N. Y.

Dear Sir: I hand you herewith certificates of stock in the American Telephone & Telegraph Company for one hundred (100) shares, to be added to the Endowment Fund of the Institute for the benefit of the Botanic Garden and to be known permanently as The Benjamin Stuart Gager Memorial Fund.

* * * * *

The income from this Fund may be added to other Endowment income for the Botanic Garden, but a separate account of the income derived from this Fund shall be kept at the Garden. This income shall not be applied to the general maintenance of the Garden, but shall be set apart and applied to the purchase of books to bear a suitable memorial bookplate, or other material for the Botanic Garden Library, except as hereinafter provided. During the incumbency of Dr. C. Stuart Gager as Director of the Garden he shall be free to apply the income from this Fund, in whole or in part, in such other way as he may think best. Dr. Gager may also, during his incumbency as Director of the Garden, recommend to the Trustees any modification governing the permanent use of the income from this Fund which he may desire to submit, and the Trustees may, at their discretion, adopt such modification. Failing any such recommendation by Dr. Gager and its acceptance by the Trustees, the income shall be used exclusively for the benefit of the Library, as first above provided.

APPENDIX 2

GIFTS RECEIVED DURING 1918

Endowment

Anonymous. The Benjamin Stuart Gager Memorial Fund	$10,000.00
Mr. Herman Stutzer. The Martha Woodward Stutzer Memorial Fund	2,500.00
Total	$12,500.00

COLLECTIONS FUND

Mr. John Anderson
Miss E. Addie Austin
Mr. Samuel P. Avery
Mr. Frank L. Babbott
Miss Mary Benson
Mr. Edw. C. Blum
Mr. William Brown
Dr. Glenworth R. Butler
Mr. Walter H. Crittenden
Mr. Albert DeSilver
Mr. John Enequist
Mr. John W. Frothingham
Mr. A. Augustus Healy
Mr. Samuel C. Hooker
Mr. Martin Joost
Miss Florence E. Longstreet
Mrs. John B. Lord
Mrs. Margaret Marx
Mr. Frank C. Munson
Mrs. W. D. Munson
Mr. Henry F. Noyes
Mr. George D. Pratt
Mr. William A. Putnam
Mr. Harold Somers
Mr. Herman Stutzer
Mr. Clifford S. Trotter
Miss Mary Van Norden
The Misses White
Mr. Alfred T. White
Mrs. F. Willenbrock
Miss Mary B. Woodward

Total, all subscriptions $10,714.00

Prizes

Mr. Alfred T. White, as follows:

War Savings Stamps (14)	$ 58.38
Thrift Stamps (200)	50.00
Silver cups (4)	45.50
Silver medals (40)	64.00
Bronze medals (50)	45.00
Total	$262.88

Plants, Seeds, and Bulbs

Mrs. Benjamin Prince (44)
Prof. T. D. A. Cockerell (6)
Miss Louise Doremus (7)
Mr. George P. Engelhardt (1)
Mr. H. C. Foster (1)
Messrs. Isaac Hicks & Son (15)
Mr. A. E. Hyde (1)
Miss Agnes V. Luther (101)
Miss Maud Purdy (1)
Miss R. N. Reeves (1)
Mr. Sanborn (1)
Mrs. J. Sanford (1)
Miss Ellen Eddy Shaw (2)
Dr. H. B. Shaw (1)
Mr. K. Strahan (1)
Mrs. Alfred T. White (1)
Mr. Alfred T. White (1)
Mr. T. L. Van Norden (1)

Total, 190

Herbarium

PHANEROGAMIC

Mr. Roland M. Harper (57)
Miss Daisy Levy (800)
Mr. C. A. Schwarze (78)

CRYPTOGAMIC

Mrs. Annie Morrill Smith (15)
Mr. C. A. Schwarze (45)
Mr. F. C. Stechert (89)

Total, 1,084

Library

Books:
- American Fern Society (2)
- American Scenic and Historic Preservation Society (1)
- Mr. Leonard Barron (26)
- Boston Public Library (1)
- Mrs. Joseph Epês Brown (25)
- Brooklyn Museum Library (3)
- Carnegie Institution of Washington (1)
- Dr. F. G. Cañizares (1)
- Mrs. M. A. Dick (54)
- Mr. Montague Free (1)
- Dr. C. S. Gager (15)
- Mrs. C. R. Hyde (1)
- L. I. Historical Society (56)
- N. J. Dept. of Conservation and Development (1)
- Dr. E. W. Olive (6)
- Mr. F. C. Stechert (1)
- Mr. G. H. Sherwood (1)
- Mr. Alfred T. White (3)

Total, 199

Pamphlets:
- Dr. Ernest Bessey (27)
- Prince Bonaparte, Paris (4)
- Mrs. E. G. Britton (4)
- Brooklyn Museum (2)
- Dr. O. A. Farwell (1)
- Dr. H. M. Fitzpatrick (3)
- Dr. C. S. Gager (49)
- Dr. R. M. Harper (2)
- L. I. Historical Society (13)
- Dr. E. D. Merrill (56)
- N. Y. City, Dept. of Education (1)
- Dr. P. J. O'Gara (5)
- Purdue University, Botanical Department (8)
- Dr. O. E. White (2)

Total, 142

Parts of publications, exclusive of government publications:
- Mr. Leonard Barron (644)
- Prince Bonaparte, Paris (5)
- Brooklyn Museum Library (28)
- Mrs. Joseph Epês Brown (136)
- Mr. Montague Free (12)
- Dr. C. S. Gager (98)
- L. I. Historical Society (27)
- Prof. Daniel S. Martin (3)
- Miss Ellen Eddy Shaw (3)
- Mrs. Annie Morrill Smith (133)
- Mr. Alfred T. White (2)
- Dr. O. E. White (2)

Total, 1,093

APPENDIX 3

PUBLICATIONS OF MEMBERS OF STAFF DURING 1918

Caparn, Harold A.

—— Public regulation of private buildings. *Landscape Architecture* 9: 133–140. April.

—— City lawns. *The Independent* 94: 212, 224–225. May 4.

—— A design for an outdoor theatre. *Journal of The International Garden Club* 2: 253–255. June.

Free, Montague

—— The small vegetable garden. *Brooklyn Botanic Garden Leaflets,* **VI**[1], April 3.

—— War Gardens. Pp. 114. New York, Harper and Brothers.

—— Everyman's garden in wartime. (Review.) *Journ. Internat. Garden Club* **2**: 295. June.

—— Fertilizers for city gardens. *Brooklyn Botanic Garden Leaflets,* **VI**[8], Oct. 20.

—— Effects of low temperatures on greenhouse plants. *Florists' Exchange* **46**: 729. Nov. 9.

—— Hibiscus syriacus. The Garden (London), **82**: 450. Dec. 7.

—— The food-producing garden. (Review.) *Journ. Internat. Garden Club* **2**: 608–609. December.

Gager, C. Stuart

—— The Ames bequest. *Brooklyn Bot. Gard. Record* **7**: 23–24. Jan.

—— The near future of botany in America. *Science N. S.* **47**: 101–115. 1 Feb.

—— Robbins's Botany of crop plants. (Review.) *Torreya* **18**: 56–57. Mch.

—— Seventh Annual Report of the Brooklyn Botanic Garden, 1917. Report of the Director. *Brooklyn Bot. Gard. Record* **7**: 33–54. April.

—— Science in peace and war. *Brooklyn Bot. Gard. Record* **7**: 89–92. July.

—— A brief history of the botanic garden idea in Brooklyn. *Brooklyn Bot. Gard. Record* **7**: 99–112. Oct.

Gundersen, Alfred

—— A sketch of plant classification from Theophrastus to the present. *Torreya* **18**: 212–219, 231–239. Nov.–Dec.

Olive, Edgar W.

—— Chapter on blue-green algae in Ward and Whipple's Fresh-water biology. January.

—— Report of the Curator of Public Instruction for 1917. *Brooklyn Bot. Gard. Record* **7**: 59–67. Ap.

—— Ward and Whipple's Fresh-water Biology. (Review.) *Torreya* **18**: 74–75. Ap.

—— Potato diseases. *Brooklyn Bot. Gard. Leaflets* **VI**[4]. May 29.
—— Murrill's and Saccardo's Names of Polypores compared. (Review.) *Torreya* **18**: 122–123. June.
—— Taubenhaus's Culture and diseases of the sweet pea. (Review.) *Journ. Internat. Garden Club* **2**: 296. June.
—— The cytological structure of Botryorhiza Hippocrateae. *Brooklyn Bot. Gard. Memoirs* **1**: 337–341. July.
—— Taubenhaus's Diseases of truck crops and their control. (Review.) *Journ. Internat. Garden Club* **2**: 610. December.

Shaw, Ellen Eddy

—— Report of the Curator of Elementary Instruction for 1917. *Brooklyn Bot. Gard. Record* **7**: April.
—— Fifth annual garden exhibit for Brooklyn boys and girls. *Brooklyn Bot. Gard. Leaflets* **VI**[5]. June 12.
—— Cooperation of the Brooklyn Botanic Garden with the Elementary schools. *Brooklyn Bot. Gard. Leaflet* **VI**[6]. Sept. 25.
—— Fifth Annual Children's Garden Exhibit. *Brooklyn Bot. Gard. Record* **7**: Oct.
—— Children's garden work plus the dollar sign. How the war affects children's gardening. *Brooklyn Bot. Gard. Leaflets* **VI**[7]. Oct. 9.

Simpson, Ray

—— Report of the Librarian. *Brooklyn Bot. Garden Record* **7**: 67–73. April.

Taylor, N.

—— Plant materials of decorative gardening. (Review.) *Journ. Internat. Garden Club* **1**: 545. 10 Jan.
—— My growing garden. (Review.) *Loc. cit.* 551.
—— Flower lore and legend. (Review.) *Loc. cit.* 552.
—— Two ecological papers. (Review.) *Torreya* **18**: 58. March, 1918.
—— Report of the curator of plants. *Brooklyn Bot. Gard. Record* **7**: 54–60. April.

—— Quantitative study of Raunkiaer's Growth-Forms as illustrated by the 400 commonest species of Long Island, N. Y. *Brooklyn Bot. Gard. Memoirs* **1**: 486–491. June 1918.

—— How to lay out suburban home grounds. (Review.) *Journ. Internat. Gar. Club* **2**: 294, 295. June.

—— The American rosè annual. (Review.) *Loc. cit.* 297, 298.

—— Effects of the severe winter on the woody plants in the Garden. *Brooklyn Bot. Gar. Record* **7**: 83–88. June.

—— Flora of Bermuda. (Review.) *Torreya* **18**: 153, 154. July.

—— Billy, the boy naturalist. (Review.) *Torreya* **18**: 229–230. November.

—— An introduction to the study of landscape design. (Review.) *Journ. Internat. Garden Club* **2**: 607. December.

—— Winter Botany. (Review.) *Loc. cit.* 609.

White, Orland E.

—— Inheritance studies in Pisum—III: The inheritance of height in peas. *Mem. Torrey Bot. Club* **17**: 316–322. June.

—— Inheritance studies on castor beans. *Brooklyn Bot. Gard. Mem.* **I**: 513–521. 6 plates. June.

—— Breeding new castor beans. *Journ. Heredity* 9: 195–200. 5 figures. May–June.

—— Our common garden vegetables, their history and their origin. *Brooklyn Bot. Gard. Leaflets* **VI**^{3}: 1–20. May 1.

—— Environment, variation and the laws of heredity. *Brooklyn Bot. Gard. Leaflets* **VI**^{2}: 1–16. Figs. 1–9. April 17.

APPENDIX 4

PUBLIC LECTURES, ADDRESSES, AND PAPERS GIVEN BY MEMBERS OF STAFF DURING 1918

By the Director of the Garden:

May 23. *Development and organization of the Brooklyn Botanic Garden.* Before the Women's National Farm and Garden Association, at the Garden.

October 10. *Scientific and educational work of the Brooklyn Botanic Garden.* Before the New York Library Club, at the Garden.

December 5. *War garden work at the Brooklyn Botanic Garden during 1918.* At the Conferonce on Garden and Garden Clubs, arranged by the Art Committee of the New York Federation of Women's Clubs. New York Public Library, Manhattan.

December 13. *Horticulture as a profession.* Commencement address. School of Horticulture for Women. Ambler, Pa.

By the Curator of Plants:

March 6. *Cultivation of native American plants.* School of Horticulture for Women, Ambler, Pa.

March 20. *Shrub collections at the Arnold Arboretum.* International Garden Club, New York.

April 9. *Patriotic address for American Defence Society.* Lyric Theatre, New York.

May 22. *Cultivation of native American plants.* Plainfield (N. J.) Garden Club.

May 23. Patriotic Address for American-British-French-Belgian Permanent Blind Relief Fund, under auspices of American Defence Society. Anderson Gallery, New York.

June 19. *Ditto* at Englewood, New Jersey.

August 8. *Cultivation of native American plants.* Newport Garden Club.

September 27. *Flora of the vicinity of New York.* New York Botanical Garden.

By the Curator of Public Instruction:

January 11. *Plant doctors and human doctors.* The Garden Teacher's Association, Brooklyn Botanic Garden.

January 30. *The scientific meetings at Pittsburgh.* Torrey Botanical Club, at the New York Botanical Garden.

April 1. *School Gardens.* Teachers of Public School 139, Brooklyn.

April 25. *Plant diseases and the wheat problem.* The Brooklyn Institute of Arts and Sciences, Department of Education. Academy of Music, Brooklyn.

October 26. *Some plant diseases of New York and Virginia.* Public lecture at the New York Botanical Garden.

By the Curator of Plant Breeding:

April 16. *What plant breeding is doing for agriculture and horticulture.* Biology teachers. Erasmus High School, Flatbush.

May 5. *Plant breeding and increased food production.* Win-the-war garden public lectures. Brooklyn Botanic Garden.

August 24. *Castor bean seed selection for 1919.* Conference of U. S. government contractors. Memphis, Tenn.

November 1. *The castor bean situation for 1919 from an agricultural standpoint.* Conference with officers of Castor Bean Section, Aircraft Production, War Dept., and interested agricultural officials. Washington, D. C.

November 5. *The castor bean situation for 1919.* Conference of Experiment Station and Extension Staff. State Agricultural College, Manhattan, Kan.

By the Curator of Elementary Instruction:

April 24. *Gardening for Women.* Wellesley College, Wellesley, Mass.

June 19. *Gardening for Girls.* Bay Ridge High School at Brooklyn Botanic Garden.

June 26. *Graduation Address.* Public School 140, Brooklyn.

July 26. *Children's Work at the Brooklyn Botanic Garden.* Before a class from Teachers' College (Columbia University), at the Brooklyn Botanic Garden.

October 3. *Bulb Culture.* Mothers' Club of the Hoagland

Kindergarten. Mission House, St. Mary's Church, Brooklyn.

October 10. *Children's Work at the Brooklyn Botanic Garden.* Before the New York Library Club meeting, at the Brooklyn Botanic Garden.

October 18. *Food Conservation.* Ethical Culture School, New York City.

November 8. *Useful Plants.* Ethical Culture School, New York City.

November 19. *Cooperation of the Brooklyn Botanic Garden with the Elementary Schools.* District Superintendents' Meeting. Public School 63, Brooklyn.

November 27. *Thanksgiving Address.* Public School 36, Brooklyn.

December 5. *Children's Gardens.* Women's Club Conference, New York City Public Library.

December 18. *Nature Study.* Nature Club, Brooklyn City Training School.

By the Assistant Curator of Elementary Instruction:

February 5. *Children's Gardens.* Rumsey Road Garden Club, New York City.

March 12. *War Gardens.* Board of Education Lecture Centre, Public School 153, Brooklyn.

March 13. *Garden Opportunities for Women.* Vassar College, Poughkeepsie, N. Y.

March 18. *Win-the-War Gardens.* Public School 170, Brooklyn.

March 19. *Win-the-War Gardens.* Board of Education Lecture Centre, Public School 152, Brooklyn.

March 20. *Win-the-War Gardens.* Board of Education Lecture Centre, Public School 89, Brooklyn.

April 2. *Win-the-War Gardens.* Public School 2, Brooklyn.

April 2. *Win-the-War Gardens.* Board of Education Lecture Centre, Public School 92, Brooklyn.

April 5. *War Gardens.* Public School 149, Brooklyn.

April 5. *Win-the-War Gardens,* Board of Education Lecture Centre, Public School 89, Brooklyn.

April 9. *Gardening.* Hollis Woman's Club, Hollis, L. I.

April 24. *War Gardens.* Erasmus Hall High School, Brooklyn.
May 9. *War Gardens.* Public School 152, Brooklyn.
May 13. *Win-the-War Gardens.* Lutheran Church, Brooklyn.
May 15. *War Gardens.* Board of Education Lecture Centre, Public School 126, Brooklyn.
May 27. *Children's Gardens.* Public School 162, Brooklyn.
May 27. *War Gardens.* Mission Church, Pacific St., Brooklyn.

By the Assistant Curator of the Herbarium:

March 2. *Spring Wild Flowers.* Children's Museum, Boston, Mass.
April 27. *Trees of the City Parks.* Flatbush Garden League, Brooklyn Botanic Garden.
May 14. *A Brief History of the Classification of Flowering Plants.* Torrey Botanical Club, American Museum of Natural History, New York.
December 1. *Evidences of Plant Evolution.* Brooklyn Ethical Culture Society.
December 26. *The Desirability of an International Numbered List of Families of Vascular Plants.* Botanical Society of America, Baltimore, Md.

By the Librarian:

June 4. *Problems in a botanical library.* Before the Senior Class, New York Public Library School, New York.
October 10. *The Brooklyn Botanic Garden Library.* Before the New York Library Club, Fall Meeting, at the Brooklyn Botanic Garden.

By the Consulting Landscape Architect:

March 9. *Garden Sculpture and Architecture.* The Metropolitan Museum of Art.
December 24. *The Impending Epidemic of War Memorials.* Before the New York Chapter, American Society of Landscape Architects.

By the Head Gardener:

February 6. *Management of soils.* New Canaan Garden Club.

March 6. *Vegetable growing.* 1. "Getting ready." Brooklyn Botanic Garden.
March 8. *Varieties of vegetables.* Greenwich Garden Club.
March 10. *Vegetable growing.* 1. "Getting ready." Brooklyn Botanic Garden.
March 13. *Vegetable growing.* 2. "Keeping busy." Brooklyn Botanic Garden.
March 14. *Vacant lot gardens.* Public School 48, Brooklyn.
March 15. *Vacant lot gardens.* Public School 128, Brooklyn.
March 17. *Vegetable growing.* 2. "Keeping busy." Brooklyn Botanic Garden.
March 18. *Vacant lot gardens.* Public School 72, Brooklyn.
March 20. *Vegetable growing.* 3. "The reward." Brooklyn Botanic Garden.
March 21. *Vacant lot gardens.* Public School 160, Brooklyn.
March 24. *Vegetable growing.* 3. "The reward," Brooklyn Botanic Garden.
March 26. *Vacant lot gardens.* Public School 163, Brooklyn.
March 30. *Vacant lot gardens.* Public School 165, Brooklyn.
April 3. *Vacant lot gardens.* Public School 175, Brooklyn.
April 4. *Vacant lot gardens.* Public School 179, Brooklyn.
April 16. *The home vegetable garden.* City Employees. Municipal Building, N. Y.
April 24. *War gardens.* Mens' Club, Episcopal Church, Ridgewood, N. J.
May 5. *Hints on vegetable growing.* Montclair War Garden Association, Montclair, N. J.
May 14. *How to make a vegetable garden.* Y. M. H. A., Bath Beach, Brooklyn.

APPENDIX 5

MEETINGS OF ORGANIZATIONS AND SOCIETIES AT THE GARDEN, 1918

March 22. Flatbush Garden League (and monthly to September).
May 20. Brooklyn Heights Seminary Club. Spring meeting.

May 23. Woman's National Farm and Garden Association. Annual meeting.

May 28. Sixth Annual Spring Inspection by Trustees, members and friends.

June 22. Eugenics Research Association. Session of Sixth Annual Meeting (Field Workers' Conference).

July 15. Federal Food Administration, New York Branch, with lecture by Mrs. August Dreyer, assistant director of the branch.

July 26. Students of gardening and nature study, Summer Session, Columbia University. (For exchange lecture by the Curator of Elementary Instruction.)

August 7. The supervisors and teachers of the Board of Education war gardens of Greater New York.

October 10. October meeting of the New York Library Club.

FORMS OF BEQUEST TO THE BROOKLYN BOTANIC GARDEN

Form of Bequest for General Purposes

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which said sum to be used for the educational and scientific work of the Brooklyn Botanic Garden.

Form of Bequest for a Curatorship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum is to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which sum is to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the.....fellowship.

Form of Bequest for other particular purposes designated by the testator

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, to be used (or the income from which to be used) for the Brooklyn Botanic Garden* .....
.....

* The following additional purposes are suggested for which endowment is needed:

1. The beautifying of the grounds.
2. The purchase of publications for the library.
3. Publishing the results of botanical investigations.
4. Popular botanical publication.
5. The endowment of a lectureship, or a lecture course.
6. Botanical illustration for publications and lectures.
7. The purchase or collection of plants.

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RECORD. Established, January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the *Annual Report* of the directors and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy.

MEMOIRS. Established, July, 1918. Published irregularly. Volume I, *Dedication Papers:* comprising scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. Price $3.50, plus postage.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

10. *Inheritance studies in Pisum. I. Inheritance of cotyledon color.* 18 pages, 4 tables. 1916.

11. *Studies of teratological phenomena in their relation to evolution and the problems of heredity. II. The nature, causes, distribution and inheritance of fasciation with special reference to its occurrence in Nicotiana.* 29 figures, 30 tables. 1916.

12. *Endemism in the flora of the vicinity of New York.* 10 pages. 1916.

13. *The origin of new varieties of Nephrolepis by orthogenetic saltation. I. Progressive variations.* 28 pages, 6 plates. 1916.

14. *A white-cedar swamp at Merrick, Long Island, and its significance.* 10 pages, 5 plates. 1916.

15. *Present status of the problem of the effect of radium rays on plant life.* 8 pages. 1916.

16. *Flora of the vicinity of New York.* 6 pages, fig. 1. 1917.

17. *Endophyllum-like rusts of Porto Rico.* 9 pages, 3 plates. 1917.

18. *Inheritance of endosperm color in maize.* 11 pages. 1917.

19. *Studies of inheritance in Pisum. II. The present state of knowledge of heredity and variation in peas.* 102 pages. 1917.

20. *Inheritance studies in Pisum. III. The inheritance of height in peas.* 7 pages, fig. 1. 1918.

21. *A sketch of plant classification from Theophrastus to the present.* 16 pages. 1918.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

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EDITED BY

C. STUART GAGER

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† Deceased, June 4, 1919.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. VIII July, 1919 No. 3

EDUCATIONAL CONFERENCE ON BIOLOGY IN NEW YORK CITY HIGH SCHOOLS

An Educational Conference on Biology in the New York City High Schools was held under the auspices of the Brooklyn Botanic Garden at the Laboratory Building, on Friday evening, April 4, 1919, Dr. C. Stuart Gager, director of the Botanic Garden, presiding. The meeting was the outcome of a symposium and conference on botanical education in secondary schools on March 11, under the auspices of the Torrey Botanical Club at the American Museum of Natural History. The conference was composed of members of the faculties of Columbia University, Barnard College, Brooklyn Training School, The Lincoln School of Teachers' College, and the scientific staffs of New York Botanical Garden and Brooklyn Botanic Garden. The speakers of the evening included Dr. R. A. Rexford, representing Dr. John L. Tildsley, Associate Superintendent of Schools, in charge of high schools in New York City, Principals Bogart of Morris High School (Bronx), Janes of Boys' High School (Brooklyn), Low of Erasmus Hall High School (Brooklyn), and Zabriskie of Washington Irving High School (Manhattan), Principal Denbigh of Packer Collegiate Institute (Brooklyn), Dr. Edward A. Bedford, Teacher of Biology in Stuyvesant High School (Manhattan), in charge of a class in method in general science at Hunter College, Dr. George C. Wood, President, New York As-

sociation of Biology Teachers, Dr. James E. Peabody, Chairman, Committee on Biology, National Educational Association, Prof. R. A. Harper, Torrey Professor of Botany, Columbia University, and Dr. Otis W. Caldwell, Director of the Lincoln School of Teachers' College.

The purpose of the meeting was to secure an expression of opinion primarily from administrative officials of New York City High Schools as to the actual and possible value of elementary biology as a high school subject. The proposed introduction of courses in general science and community civics in the first year of New York City High Schools created the possibility of the elimination or serious curtailment of biology.

It was the unanimous opinion of every speaker that biology, both in content and in educational discipline, contributes something essential in the preparation of young men and young women for citizenship and which is not afforded by any other subject, and it was the expressed opinion of all of the principals that the elimination of general biology from the high school course of study, or its curtailment, would be an educational mistake. All of the speakers emphasized the necessity of planning a content of the course so as to make a very intimate and obvious co-relation with the every-day life of the individual.

The conference is considered by many as the most important meeting for the consideration of this question that has ever been held in New York City, and the result was especially significant in view of a commonly expressed opinion—shown by this conference to be wholly erroneous—that many if not all of the high school principals were opposed to the subject of elementary biology. The substance of the remarks of the various speakers, based upon stenographic notes, is given below.

The Chairman: I am very glad indeed to extend a welcome to each one of you on behalf of the Brooklyn Botanic Garden. I am not able to extend a welcome to you as an organization, for we are not met here as an organization, but as a group of individuals whose common interest is secondary education, and particularly the place and function, or possible place and function of botany and general biology in secondary education. Moreover, I can say nothing in addition to the statement which is on the an-

nouncement of the meeting, as to what it is which has brought us together. We are at the beginning of a new era of reconstruction. One of the questions for us to consider is: Does biology, especially as a subject of secondary education in public and private schools, need reconstruction in any way *because of the war?* Has the war brought to light any things which were not brought to light before the war? That is the problem before us.

The meeting which was held two or three weeks ago, under the auspices of the Torrey Botanical Club, was for the purpose of finding out whether biology did need reconstruction. As a result of the discussion at that meeting, many things were brought to light. One was that there is a feeling among many teachers, as well as among those outside the teaching profession, that biology does need reconstruction as a part of the high school course of study. The second was that there is considerable pressure brought to bear to introduce new subjects into the city high schools, and two subjects were mentioned, namely, general science and community civics. Then a third thing was brought out, namely, that these subjects are proposed for the first year of the high school, and that the first year of the high school has already a full schedule, and that no more could be introduced unless we eliminated, or very greatly curtailed, some subjects there already. And then, of course, another fact came to light, and that was that there are a number of persons, some of them in the administrative department of the public school system, who are actually opposed to biology in the high school, and have so stated. This, I think, was a real revelation to many people. And further, there was a feeling that it would be an advantage to have a discussion, particularly with those who are in doubt as to whether biology, as now taught in the high schools, is accomplishing all that it might accomplish—as much as other subjects are accomplishing. With that object in mind, it was voted that the Director of the Brooklyn Botanic Garden be asked to call a conference for that purpose.

The date of this meeting was set only after an exchange of letters with Dr. Tildsley, Associate Superintendent of Schools of New York City, for the purpose of getting a date on which Dr. Tildsley could be present, as everybody felt that he would undoubtedly have something to say which would not only interest

us all, but would throw considerable light upon the questions we are called together to discuss. But I have received a letter from Dr. Tildsley, at the last moment, in which he states that there is a business engagement in connection with the Board of Education which absolutely requires his presence this evening, and he cannot possibly be here. I therefore take the liberty of reading a paragraph from his letter to me:

"I am not especially for or against high school biology. I have seen some work that impressed me as having great value; I have seen some work that impressed me as having little value. I think there is no subject in the high schools taught with such inequality of results."

That, perhaps, might be a guiding thought in some of the remarks of those who are to speak. Dr. Tildsley has asked Mr. Rexford to speak in his place.

Mr. Rexford: *Mr. Chairman.* I am glad to represent Dr. Tildsley. Allow me to read what I have written down. This is what I think he would say if he were here:

"I do not want to see either biology or general science a 'required subject' at the expense of the other—and I have no fear that such a situation will exist. Each of these subjects, I believe, should stand on its own feet, so to speak, as an elective, and should be justified or condemned by its accomplishment in giving the child such scientific knowledge as he needs to know, wants to know, and has a right to know."*

It is rather an embarrassing position to put a person in, to try to say, perhaps, what the other man would say. I shall hand Dr. Tildsley this in the morning, and tell him he said it. I thank you.

The Chairman: I think we will agree with Mr. Rexford that this is a difficult position to put him in. Principal Bogart, or Morris High School, was one of the first men to agree to be present and give us his ideas. Principal Bogart.

Principal Bogart: *Mr. Chairman.* I have been principal of a school about sixty-nine days; I have visited a great many classes, and this is the first thought I formed, and which I want to express here: In going about among the classes (community civics,

* Note: Mr. Rexford read a statement covering several pages of manuscript. Matter read was not taken down by the stenographer, and at the close of the conference Mr. Rexford would leave with the Chairman only the last paragraph of his statement, as quoted above.

biology, general science, and hygiene), I have been unable to tell which subject I was in until I asked (unless I had it on my card), as I found the teachers and pupils all doing about the same thing. I came to the conclusion that biology, in our own school, is, in part, a misnomer, because there is a great deal of civics in it, and I have come to the conclusion, too, that general science, as far as I can discover, is not a science at all. I find that general science seems to be a conglomeration of information, interesting and amusing, very much like Steele's "Fourteen Weeks," in very interesting form, in very interesting books; I have enjoyed looking through some eight or ten of these books, and I find them most attractive, and I know they are attractive to students. Now as to the value of general science. I am open minded. I have no prejudices. I can endorse exactly what Mr. Rexford just said. I think if I had my way, I should place general science in the last year of the grammar school. I realize that it is attractive, and covers the points that the boy is directly interested in, but the topics are not connected; it does not begin to have the unity that the biology course has, and, in my opinion, the situation calls not for the displacement of biology, but for the readjustment of it. I feel that these four subjects have much matter in common, and they should be merged and presented in first year science. I know the biology courses differ very much in schools, and still I think that biology has surely a claim to continue; I, for one, would vote for its continuation, with some modification.

The Chairman: We are glad to welcome Principal Denbigh, of the Packer Collegiate Institute, formerly principal of Morris High School.

Principal Denbigh: *Mr. Chairman, Ladies and Gentlemen:* The subject of this evening's conference really makes me feel young again, because I can remember fifteen years ago when we threshed out this same question. The subject of biology was very near being banished from the New York public schools about that time, how near, I think, some of us did not know. But it was finally decided to retain it, and it is my opinion that it is growing to be a more and more practically taught subject all the time. Now I think of it to-night in its general relation to education, and I want to ask you whether I am right or not in believing that,

somewhere along the line, in educating children, we lose what is their naïve curiosity when they are little. If you think of them in their first years, they learn a large number of things. They want to learn, and by and by, shortly after they reach us in high school, that curiosity seems to evaporate, and it becomes very necessary to use a method almost of compulsion. Something is wrong, and I think we might well learn from the child himself in this matter of teaching. A good teacher invariably does, and he works along lines that would interest children. Do not mistake me in my use of the word "interest." I do not mean to make the work soft, and avoid those things which a child ought to do. But I mean to say that there is a way of teaching that will preserve the curiosity and interest of a boy or girl, and I think that that interest and curiosity must be preserved if we are to secure the best results in our teaching. If a student is to enter into his educational inheritance, as Dr. Butler would put it, he must, of course, have a training in languages, especially in his own language, and as much more as he can get. He must have some æsthetic training. It is only right that his parents should give him some religious training, and, if his eyes are to be opened, he must have some scientific training. Huxley said a man without scientific training was like a man who walks through a picture gallery, where most of the pictures are turned to the wall. Unless a man has had some scientific training, he will never know which of the pictures should be turned the other way. Now to insure this scientific inheritance, to enable the student to open his eyes to the world about him, it seems to me there are two or three fundamental things he should have. In the first place, he must have an amount of actual knowledge of facts; in the next place, he must have carefully cultivated a power of observation, and in the third place, he must have been taught how to draw conclusions from the observations made. These are the three requisites of any training in science. Now, when I think of the subjects that we can offer to our students, I can think of no subject that will enable us to give these fundamentals in as useful, practical, interesting, and lively a manner as will the subject of elementary biology, properly taught. And let me say that I think no subject has been more abused than elementary biology for some

reason or other. I believe it is because most of the teachers of biology have been largely interested in original research, and they have dissected dog, fish, or what not, for the best part of the year, so that they come to school with a greater tendency than other teachers to teach as if they were teaching college students. This must be most carefully guarded against. Again, I think it is important where you place the emphasis in teaching biology. Biology is the science of life—of living things, and you ought, therefore, to restrict the study of structure to what is absolutely necessary in order to understand function, placing the emphasis on function. You ought not to have your students drawing things that take them hours and hours to draw. You ought not to have them peering through the high-powered microscope. I remember hearing a man from Charleston speak about this course. He heard two students talking together. "How many times a week do you have biology?" "Well, we have biology three times a week and laboratory twice." Now that description makes exactly clear what I mean. If the laboratory work has become a drawing lesson, more than a biology lesson, then its purpose is lost. So that I say it is the interpretation that is important. It is where you place the emphasis. I think that elementary biology should be taught so that it gives a student a chance to understand the most familiar phenomena in the group of plants. I think it should lead on to an understanding of the most familiar functions of animal life, with a slightly more intensive understanding of two or three type-forms of animals, all with the purpose of leading up to some very practical, useful work in physiology and hygiene. And then I think you should teach the subject so as to give all possible elementary scientific training. The power of observation should be cultivated, and what is just as important, the power of interpretation, and the power of expression, both oral and written. If there is one subject more than another that will tend to exact descriptions, surely that subject must be science. If there is one subject in which a description should be clear, surely that subject is science. If thought is clear, description will be clear, and if description is not clear, it is almost certain that the thought is not clear. But why elementary biology? I should say because it gives us vitally important information, combined with what is

best in science training. General science will not carry over into the life of the student so much that is practical and related to everyday life as elementary biology will. I am rejoiced to hear Mr. Bogart say that he cannot tell which subject they are teaching in the different classes. That shows that something has been found that is extremely useful. It is useful that the student should have some knowledge of himself; it is useful that he should have an elementary knowledge of what constitutes a danger when a wound is not properly dressed; that he should have a little knowledge of the commonest kind of first aid; that he should understand the danger of flies and mosquitoes; that he should know how to find out whether water is impure, or whether milk has dangerous bacteria in it. He ought to know something about ventilation. We see that this subject of biology has a very practical value. I think that if the war has taught us anything, it surely has taught us that we ought to make practical the work of the public schools, and all other schools, and if there is a subject that is more closely related to the life of men and women of to-day than elementary biology, I do not know what it is; if there is a subject that is more important to the American people to-day than the preservation of good health, I do not know what it is. And those statistics that we read with so much astonishment, of the men rejected under the provisions of the late draft, are confirmation of its importance. Let your algebra go, if need be, but keep your elementary biology. Keep your elementary biology the first year, if possible; if not, keep it for the second, but do not let it be postponed later than that, for in these two years the bulk of your students come and go.

The Chairman: I cannot refrain from calling attention to one point which Mr. Denbigh made; I think it is of vital importance, and that is the necessity, in preparation for teaching in secondary schools, of knowing something besides the subject which one is going to teach. Mr. Denbigh also touched upon another point which could be expanded with great profit, and that is that this problem can never be settled solely on the basis of personal opinion, but only in the light of general principles of education, of which this problem of biology is only one small phase.

The next speaker is Principal Janes, of Boys' High School, Brooklyn.

Principal Janes: *Mr. Chairman:* Biology has value on several grounds. We might speak of its cultural value, its economic value, and its disciplinary value, but I will confine myself to one, that is to say its physiological value.

There has been much talk recently of reconstruction, not only of cities, towns and homes, but also of industry, government, church and education. While it is no doubt necessary that this reconstruction take place, and while it is essential that there be a rebuilding along all lines, it by no means follows that all that has been done in the past has been of no avail. Change there must be in order to meet present and future requirements, but that change does not necessarily call for "scrapping" all that has been done in the past. It seems to be the thought of many that whatever has been is, on that account, wrong. We should prepare ourselves for changes, but let us have no hysteria about it. Let us save out of the past that which has been good, and make better that which is capable of improvement. But in general it is agreed that our school work must be made more immediately and ultimately practical, and must touch the pupil's life closely. It must appeal to his interest. In my estimation biology has accomplished just this thing.

A questionnaire was recently filled out by several hundred third term boys in Boys' High School, in which the question was asked, "Which first year subject did you like best?"; the answer in the majority of cases was "Biology." Another question was, "What part of Biology did you like best?", and again the answer was, "That part which deals with the human body." If this questionnaire tells us the truth of the case, and I believe it does, it becomes evidence which is strongly in favor of biology. It appeals to, and has its interest for, the pupil.

As to the practical need for the study of physiology, you hardly need be reminded of the thirty per cent. of drafted men who were rejected, and of the fact that eighty per cent. of pupils in public schools suffer from eye, ear, or throat trouble. To offset this condition is a duty which the public schools cannot escape. The young of our nation must have a knowledge of the relation of foods to physical efficiency, of the necessity for the regulation of personal habits, causes and prevention of disease, and of the

importance of foods that are pure and medicines that are safe. Pure food laws on our statute books will have no value unless they are backed by public opinion. This can be brought about best through the schools. Propaganda for cleanliness of homes and city is best promulgated through the medium of our school children. If Biology taught nothing else than physiology, it would amply justify itself.

The Chairman: It begins to look almost as though some explanation were necessary from the Chairman of the meeting. It looks as though the cards were stacked. I wish to state that these gentlemen on the program were asked to speak, without the slightest knowledge of whether they were for, or against, biology. The next speaker will be Principal Low, of Erasmus Hall High School, Brooklyn.

Principal Low: *Mr. Chairman:* Like some of the gentlemen who have spoken before me, I claim to know nothing of biology. I could continue that confession of ignorance beyond where they did, but it is sufficient to limit it to biology. However, I feel in Erasmus Hall that I know what subject is being taught in the class that I go into. I did not come down here to-night to give my own personal view of biology. It seemed to me that it was wiser to present to you the results of similar conferences I have attended, and perhaps to discuss some of the points I have learned from others. I considered that if I asked the students of the first year whether they liked biology or not I would get genuine answers, but, in many cases, the liking would depend on the teacher more than on the subject, and more than that, a popular teacher might not be the best teacher. I asked it of the senior class, four years beyond the time where they had taken biology, and this answer is, I think, rather interesting: Out of 170 students, there were 61 boys and 109 girls. Now of the boys, looking back over their four years to find out whether they thought biology of value, I got this result; 52 said yes and 9 said no. Of the girls, 80 said yes and 29 no. A very much larger proportion of girls than of boys disapproved of the subject, either in the first year, or in the curriculum at all, and when I spoke to one of the biology teachers about it, she said, "Yes, I have always noticed that." The net result of the vote is this: 132, all told, declared for biology, and

38 against it. Several of those who declared against it said they did not remember a thing about it, not one solitary thing, and if that is so regarding biology, it seems to me it would be a minus quantity if we applied it to general science. I want to read two answers that I got from two of my students. One young lady thought biology a useful and essential study for all schools because "One can never get away from food and flowers." I hope her good fortune will continue. And the other one, with entire frankness, said this: "Biology—I am afriad I did not derive much benefit from that subject, because the only thing I can remember is drawing a fish, and I cannot see what good that did me."

The record of percentages of failures in seven subjects in Erasmus Hall High School from four consecutive terms (1917–1919) was as follows: French, 48.3 per cent.; Mathematics, 40.6 per cent.; Spanish, 38.5 per cent.; German, 32.5 per cent.; Latin, 31.4 per cent.; Science, 24.4 per cent.; English, 13 per cent. From these figures it would seem that the percentage of failures in Science (including Biology), is less than in mathematics and languages (5 subjects), and only second to English.

Now, that is not the only measure I took. I sent a notice around the school saying: "If you were a 'class teacher' of a biology class within the last year, please tell me what you think of the value of biology. This is not to be answered by biology teachers." As a result of this, I got answers from teachers of the following subjects: English, Mathematics, History, French, Stenography, and Spanish, everyone a class teacher, and many of a class which, of course, took biology. The interesting thing was that there was not a single one of those teachers who was not enthusiastic about the study of biology, and I want, if you will allow me, to read you a few of their statements:

"Its facts and purposes are fundamental to all social and educational development, and it should be a required subject."

"Valuable for its emphasis on the value of human life, and, therefore a direct help towards civic betterment and human improvement."

"Teaches valuable habits of personal care and is a fine introduction to the study of science."

"A vital subject for my students. Those who do not like it

always do poor work in everything. Many like it who do poor work in everything."

"I do not want my own children ignorant of the fundamental principles of life beyond the age of 14. It has increased the interest in agriculture."

"Valuable practical results in personal cleanliness, care of health and interest in outdoor life. Its sanitary effect is marked."

"Practical value in teaching food values."

"Biology the most practical study in the high school."

"More interest and enthusiasm about biology than about any other one subject."

"Children uniformly interested. Particularly valuable for a city child. Valuable exercises in gathering and organizing material."

"For the past year I have been very closely in touch with a first year class. During that time I have been increasingly impressed with what Biology is doing for the children. They learn a lot about things they ought to know and would not get in any other way, and they learn in a scientific manner. There is no subject that they talk so much about as Biology. I feel that Biology is the most valuable and vital subject of the first year in the High School."

"I have a very strong feeling that Biology is an extremely important subject. It forms the foundation of all health studies, prepares the way for later applied sciences including cooking, and is of practical value in many other ways. From the purely educational viewpoint, when properly taught, it does more to open the eyes of pupils, to cultivate the power of observation, and stimulate the desire for investigation, than any other course in the school. Besides this, it has a deep significance in its relation to and explanation of the deeper spiritual problem of life. People are daily becoming more concerned in these problems, and we shall not be doing our duty by future generations, if we fail to supply the knowledge that furnished a partial solution of the meaning of life. In addition to this, Biology properly taught has a moralizing and spiritualizing influence by its very nature. Whenever it hasn't such an influence the fault is in the teaching, not in the subject."

The Chairman: Principal Zabriskie, of the Washington Irving High School, intended to be present, but writes me under date of March 26, that it will be impossible for him to do so, and says: "I am sending these few words to express my unreserved approval of the value of biology as a high school subject. Frankly, I am surprised at the statement made that biology 'does not function.' I assume the phrase is meant to convey the thought that it has little actual bearing upon the lives of students. If this is so, the criticism is rather one upon the method of instruction than upon the study itself, for I believe the subject of biology is one of the most important means for the development of correct habits of hygienic living and of civic responsibility."

I have asked, outside of the administrative officers of the school system, three speakers from among the teaching body. I thought it was no more than courteous that the President of the Biology Teachers' Association should have an opportunity to speak on behalf of the teachers, and I have asked Dr. Bedford to speak because he is conducting a teachers' class in General Science at Hunter College.

Dr. Bedford: *Mr. Chairman, Ladies and Gentlemen:* I am heartily in favor of biology in high schools, but doubt whether it should be the introductory course. In discussing high school work the needs of biology or of any special science deserves no consideration; the only consideration is that of the need of the pupil. We must deliberate as teachers, not as scientists.

The pupil at the ninth year has reached a stage in which he is not ready for the generalizations of the special sciences, but *is* ready for an explanation of the common things about him which demand what we call a scientific explanation. He is at the very crest of the wave of inquiry or curiosity, and now has the ability to appreciate the meaning of things. He is interested in his environment as a whole. The painstaking working out of details for the sake of development of principles does not appeal to him at this time.

Biology as a first year science has been successful just to the extent that it has ceased to be specifically biological and has become more of a study of the environment. Every biology teacher will tell you that the biology offered in the first year course to-day

cannot be compared with such courses offered fifteen or twenty years ago. Is it because it has become more biological? No. It is because the teaching of biological principles has ceased to be the center of the course, and the course has so changed that the pupils' interests have become more nearly that center.

Some of the most successful courses have so broadened that while they are called biology courses, they are really general science with emphasis upon the biological phases of the environment. This is trending in the right direction, but should we stop here? If the pupils' interests were confined to the biological phases of their environment, then we have reached our goal in the development of the first year science course. But the pupils are interested in the common things about them, regardless of whether they are biological, physical, chemical, astronomical, or physiographical. In fact, many of the things in which they are interested may borrow from a number of these aspects of natural science.

To restrict the pupils to any one phase of their environment—whether biological, physical, or chemical—violates their interest and the spirit of introductory science. Large numbers of pupils leave high school at the end of the first year. They need the general view of their environment, rather than the restricted view of the special science.

The aims of introductory science may be condensed as follows: First, to put the pupil in possession of certain fundamental facts concerning his environment which may incidentally form a basis for future science work, but, what is more important now, give him an explanation of many everyday activities and furnish him with a fund of usable facts gained by the only true process of learning. Second (and even more important than the first, since the first depends upon it), to encourage and develop the spirit of inquiry—of wanting to know how things happen. Also to cultivate the essentials of scientific thinking, the attitude of independent judgment, of openmindedness and of reliance upon facts. These aims cannot be accomplished if pupils are carefully kept in one pigeon hole.

Does this broader, introductory course eliminate biology from the first year? Ask the biology teacher of first year pupils what

biological facts he expects his pupils to have mastered by the end of the year. You will find that every up-to-date course in general science includes practically all of this material linked up vitally with their general knowledge, so that it is better understood than if studied from the biological viewpoint alone.

Does the introduction of the broader course in the first year mean the cutting out of biology, with the exception of such as is included in this first year course? Emphatically it does not. Having had general science the first year, pupils will have a basis for a sane election of the mere specialized phases of science. Pupils will take biology because they want it. Teachers who have been teaching biology to all comers cannot realize the joy of working with such classes.

In the Stuyvesant High School every boy who can possibly get biology on his program is taking it. Five years ago there was no biology in the school; now approximately two hundred seniors are carrying on the work, although with all the required shop work there is probably no school in the city where there is less freedom of election. Fear that biology will drop out, if made elective in the upper years, is an admission of doubt as to its value.

Will there be an opportunity for pupils to elect it? There is a tendency to make the specific subjects above the first year elective to a very great extent. I advocate that two sciences (laboratory) be required as a minimum after the required introductory science. Of course this will not prevent a pupil from taking more. All the advanced science courses will receive added life from the introductory year of general science.

The science curriculum of the entire twelve grades must be overhauled. If properly organized, the Nature Study carried on in the grades will contribute directly to the science work of the high school. This will be especially true of the work in biology. The first year of high school or the last year of junior high school is a transition period from Nature Study point of view to the more strictly science courses of the upper years of the high school.

Altogether, with the rejuvenation of the Nature Study of the grades, the biology content of the introductory or general science courses of the first year of the high school, and the real biology

courses of the upper years of the high school, biology is to receive, in the system of public education, greater recognition than ever before.

The Chairman: The next speaker is Dr. George C. Wood, President of the New York Association of Biology Teachers.

Dr. Wood: I am to speak not as the representative or mouthpiece of the Association of Biology Teachers, but as an individual teacher of science who is now experiencing the new sensation of a gradual transition from one science to another. I say this because, so far as I have been able to observe, the sentiment of the Association has not yet been crystallized and I cannot, therefore, bring to you its convictions upon the subject before us this evening.

We are met to discuss the present tendencies relative to the teaching of biology in our high schools. There is a feeling among some of us that Biology is in serious danger of being crowded out of the curriculum to make way for General Science and possibly Community Civics. There apparently is some foundation for this feeling, but I am not so sure that the danger is as real as it seems.

The outside criticism (and by this I mean the criticism of the average citizen, and if I may be permitted to say it, the average high school principal, and some of the members of the Board of Superintendents are included in this group) is largely from those who harp upon one string, namely, that Biology does not interest the average high school pupil, and therefore it does not make good. To this I immediately reply that I would like to know if there is any subject in the curriculum of the first year of the high school over which the average pupil waxes exuberant. I know of none, but I do know that the excessive mortality—that is the failures—is never laid at the door of biology. The languages and the mathematics are responsible for the greatest number of failures. Do students as a rule fail in the subjects which they dearly love? To admit or accept this charge of a lack of interest at once brings in its train the logical conclusion that all the subjects of the first year must go, because the average pupil is not interested in them. No, the crux of the matter is not in the lack of interest in the subject. The real test of the value of biology, aside from its interest-giving qualities, which I claim are as great if not

greater than in any other first year subject—the real test, I say, is this: Does Biology give the average pupil what he needs to help him in adapting himself to the necessities of his environment, and does it teach him to act in the bettering of that environment? To this question I would most emphatically answer "Yes." Biology does do these things and does them well, and moreover, does them far better than any other first year subject. Especially is this so since the remarkable change in front in biology which has occurred during the last 15 years, a change from the purely disciplinary viewpoint to that of the conservation of the individual and of the race. This now seems to be the chief claim of biology for just consideration, and this claim alone should make its place secure in the school curriculum. But I sometimes wonder, if this gradual change of front has not weakened, rather than stregnthened the case of biology, in view of the present unexpected developments, such as the new Physical Training law, the required hygiene work in all schools, and the development of General Science. The belief seems to have gained credence that, since biology has given itself so unreservedly to the work of hygiene in order to secure its present position now, under the new conditions, this work can as well be done by other agencies, and biology can be removed from the course of study. The answer to this is final—no other agency is as fitted or prepared to present the problems of hygiene to the first year high school pupil. The teacher of biology is prepared to do this work and it will never succeed under any other guidance. I am, therefore, convinced that no attempt to eliminate the teacher of biology as a trusted guide in matters of hygiene will ever be successful, provided the common sense of the public can be properly aroused, and as long as the teacher of biology keeps before him, as the core of his teaching, the health, well being, efficiency, and happiness of the individual child. . . . Now as to my conclusions.

(1) Biology as a science should not be eliminated, and must not be eliminated from our high schools.

(2) The problem of teaching the principles of hygiene can well be solved by including them in a course in general science.

(3) A course in general science should be taught by the teachers in biology.

(4) A real course in biology, with a standing as a science on a par with Physics and Chemistry, should be put in the second year of the high school course. In Commercial High School, I have been able to have such a course, with commercial emphasis, placed in the third year.

(5) There should be a full sequence of sciences in the high school through the four years—General Science or its equivalent, Biology, Chemistry, and Physics.

The Chairman: The next speaker will be Dr. James E. Peabody, Chairman of the Committee on Biology of the National Educational Association.

Status of Biology in the High Schools of New York City

Mr. Chairman, Ladies and Gentlemen: Most of us biology teachers have, I think, experienced during the last twelve months three distinct "shell shocks" as a result of the activities of "Headquarters" at 59th Street. The first came in the form of a brief item that appeared on one of the pages of the New York *Times* last May. There we read that General Science and Community Civics were to be introduced into the first year of the high school course. Only one conclusion seemed possible—namely, that biology was to be replaced by these new subjects. So far as I know, none of the high school principals were consulted as to the advisability of this revolutionary change. Certain it is that our Association was not called into conference. If general science is to be substituted for biology, the job must be ours, for no other group of teachers has the training or experience for undertaking this piece of work. When I talked with Dr. Tildsley about this matter, I learned that the three subjects (biology, general science, and community civics) were all to be made available for first year students, and that then it was to be "a struggle for existence and the survival of the fittest."

The second "shell shock" was experienced at a meeting of the high school principals. I was invited to be present and to give a report of the Washington conference, and to give my ideas relative to general science. During the conference Dr. Tildsley made the surprising statement that for sixty per cent. of first year students biology did not function. When asked to state the source

of his information, he replied that he formed his judgment from debates he heard while Principal of the High School of Commerce.

The latest "shell shock" comes with the appearance of the "Temporary Outline for Community Civics." I have gone over each of the 45 main topics in this syllabus and have called Dr. Tildsley's attention to the fact that at least twenty of these subdivisions can be taught by biology teachers better than by any other instructors. Surely this is something of a tribute to a decadent and non-functional subject!

I wish now to raise three questions and to state briefly my answer to each.

First—Is it true that biology has not and is not making good in our high schools? In order to determine from students themselves their opinions relative to the content of the biology course, I have conducted several distinct questionnaires and have carefully tabulated and compared the results. The first series of figures were obtained in January, 1915, in preparation for a paper given at the Cincinnati meeting of the N. E. A. Department of Superintendence. All the first year students in the Morris High School and in the High Schools of Mount Vernon, New Rochelle, Yonkers, and White Plains were asked to state which of their four prepared subjects was easiest, which was hardest, which they liked best, and which they liked least. Two subsequent questionnaires were tabulated last year, and I have the figures from more than half the high schools in which, during the past month, all those who had completed a year of science in January were asked to record their judgments relative to their first year subjects. A summary of the results of these questionnaires is given on pages that follow.

Dr. Tildsley, in his letter of acceptance to Dr. Gager—a letter which the Associate Superintendent asked me to read—makes this statement: "I am not especially for or against high school biology. I have seen some work that impressed me as having great value; I have seen a great deal of work that impressed me as having little value. I think there is no subject in the high schools taught with more inequality of results."

Since Dr. Tildsley, from debates heard in the High School of

Commerce, formed his judgment that "for 60 per cent. of first year students biology does not function," I believe he might be influenced to alter this judgment after a study of the questionnaires to which I have referred. The answer papers of over 4,500 boys and girls apparently show that no subject in the curriculum is taught with *less* inequality of results (*e. g.*, the per cents. of those liking biology best in 1915, 1918, 1919, show a range of only 2 per cent., while the percentages in English show a divergence of 10 per cent.).

The second question I wish to discuss is this—"Is general science, as organized at present, better adapted than biology to the needs and interests of first year students in the high school?" In the preliminary report of our N. E. A. Committee, published in 1914, and in the revised report of 1916, we unanimously recommend that at least two years of elementary science should be possible for every boy and girl. We urged that the interesting facts of general science should be taught in the seventh and eighth grades, and that biology be studied in the first year of the high school. The growing demand for the Junior High School in our judgment makes such a curriculum possible and most desirable. The Washington conference, and the final report of the Science Committee of the N. E. A., which is soon to appear, specially emphasizes this plan.

Principal Clark, of the Flushing High School, has so well expressed my feeling relative to general science that I beg leave to read one paragraph from his letter. "My principal objection to general science is that it is so general that it does not go into any one subject with sufficient thoroughness. Biology has been taught so long that there is a definite content. Pupils do derive from it considerable benefit in investigation, experimentation, and the drawing of conclusions." May I add that it seems to me far more difficult to carry on real laboratory work in large classes in a general science course than it is in biology, and that for me any science course that doles out mere text-book information, however interesting it may be, is badly misnamed if christened as high school science.

I come now to my third and final question—"Will the suggested syllabus in community civics appeal strongly to first year

students and combat the growing perils of Bolshevism in our midst?"—for these I am informed are the reasons for introducing this subject. Turning to the civics syllabus itself, I humbly ask if 14-year-old students are likely to be carried away with enthusiasm in discussing such topics as the following: tax budget, sources of revenue, assessment, apportionment of funds, control of city finances, city ordinances, origination of bills in the state legislature, and a good many other topics of like nature that I might quote. I am reliably informed that this subject is being admirably taught in a few of the schools by well trained and enthusiastic teachers, but I cannot help wondering if they are sticking close to their syllabus.

In the desire to learn, if possible, what kind of science material would be likely to "function" best in the first year of the high school, the teachers in the biology classes in the Morris High School made an investigation in their own classes. Students were asked to put down on paper a list of the topics they would like to study in a course in elementary science. One of the teachers, for example, introduced the subject as follows:

"We are thinking of changing our course in Biology in such a way as to make it more beneficial to you. Heretofore, the first year science dealt with living things only, now, we intend to broaden out, if necessary, and include any topic that will help you to adapt yourself to your environment. To help us formulate the new course we have come to you for advice. What topics do you think ought to be included? Why? Keep in mind that the topics you suggest need not necessarily be topics that are biological; for example, they may be stars, the weather, automobiles, and the like."

Anther teacher went so far as to copy on the board a list of topics from the table of contents of one of the best books on general science. Over one thousand topics were written and were tabulated in four groups, with the following results:

Astronomical topics	(124)	13 per cent.
Physical topics	(251)	26 per cent.
Chemical topics	(88)	6 per cent.
Biological topics	(559)	55 per cent.

If these answers mean anything they would seem to imply that

the boys and girls, in Morris High School at least, believe that biological subjects come closest to their everyday interests.

General Conclusions Relative to First Year Science

1. The unprejudiced judgments of a majority of our High School Principals declare that our present courses in first year biology have been and are making good. Dr. Low's statement relative to the opinions of seniors in Erasmus Hall High School, and of teachers of all the subjects other than biology, confirms this judgment in a very striking manner.

2. The anonymous opinions of nearly five thousand students who have taken the biological courses—opinions gathered from four questionnaires in 1915, 1918, and in 1919 in many different high schools—show that the boys and girls themselves believe that biology as taught at present is at least next to English the most popular and useful course of the first year.

3. While it is probably true that some of the topics rather technical in nature (*e. g.*, details of anatomy, physiology, and microscopical structure of living things), might well be displaced to rather a large extent in some schools by topics of a more general character (*e. g.*, gas stoves, electric bells, phonographs, and other practical appliances in the home), the larger majority of the subjects discussed should still be those of a biological nature.

4. Every questionnaire tabulated shows that boys and girls believe that the human biology is the most important part of the course. Every topic, therefore, which is introduced into the first year science might well be challenged as to its relation to human welfare. This is especially true in view of the large number of rejections by draft boards due to physical disability.

5. Since most of the topics that appeal to first year students listed in community civics are at present being taught in biology, the two subjects should be merged into one, and the resulting combination course in elementary science and civics should be taught at least in coöperation with biology teachers, and should be required of every student in all courses.

The Chairman: Principal Rainey expected at first to be present, but told me later, before the program was completed, that he would be unable to be here. He writes: "we intend to teach biology under the name of 'general science.'"

I always think it is a good thing to get the views of someone who can see from a greater distance, and thus get a truer perspective, than those can who are right in the work every day. A university professor is right in the work of biology every day, but is not in the work of teaching a high school student, and, therefore, there are certain problems that he can see at a truer angle. Professor Harper, of Columbia University, will now speak.

Professor Harper: What has been said with reference to the practical significance of biology, with reference to the individual, his life, health, his home life, all that I believe in most thoroughly and heartily. Its importance cannot be overestimated; its importance has not been unrecognized by us teachers. To make our work of immediate practical value is an aim that we cannot overestimate in its importance; but that the practical is inconsistent with the ultimately practical, that that which is practical to-day may not be best for long in the future, is not, it seems to me, so absolutely clear. And so I want to say I believe that school teachers, whether in the university, or high school, or grades, or kindergarten, must remember that the most we realize about men, boys, women, and girls is that they are nothing but animals with an ambition to become understanding animals; with the power that comes with knowledge. Knowledge may interpret itself; it is power; it is the thing that gives the grown man the greatest pride in himself; the boy the greatest pride in himself; the girl the greatest pride in herself. It is not what he knows, what he understands, that he respects himself for. That does not mean that we have to eat and live in associations or organizations, under great difficulty with mixed desires, opinions and theories and all that. The function of the lowest animals is to administer to this side of the being. In ministering to this side of our many-sided make up, I believe that many of the other things will be added unto us, also things of more immediate significance. The knowing, the understanding, is the power, after all, that places the man in business, that places the inventor, that places the scholar; it is the thing that counts. We are becoming every day more convinced of the highest capacities of human life. Do not let us be afraid of science itself. It is our own product. The

science of botany and of biology, as it is to-day, is the best that the human intellect can get out of itself, and that the child is not capable of beginning to appreciate that, I can hardly admit, although I am far from immediate contact with children. The child, it seems to me, demands leadership. The child, after all, comes to its teacher not merely to express itself, but to get an opportunity to do something better, to be led into something more entertaining, more interesting than it can itself achieve, and we do not need to be afraid if we know our biology, I am sure, of taking the child with us into the knowledge we have, as far as we can, assuming that he does want to be led and instructed with the best that we have. The great difficulty I most feel with our teaching, and especially with university teaching, is that we are not enough devoted to the subject. We feel that we have got to adopt the argument of the other man to defend it. We do not feel sure enough of it so that the subject dominates all our own work. I cannot conceive that a teacher can be thoroughly successful who is more interested in the pupil than he is in the subject, because I feel if he is more interested in the pupil than he is in the subject, if he is more concerned in taking the viewpoint of the pupil than the subject, what has he for the pupil? Nothing new. The pupil comes to the teacher with his own viewpoint; he has the right to expect of the teacher that he will meet there a person with something exceptional that he has not worked up to. What object should we have? To inspire them, to show them by our example that we believe actually that a person who devotes himself to digging down into a knowledge of the fundamentals of life, will make himself happy. If we can impress that on our pupils, even the little foreigners that so many of us come in contact with, I believe that we shall overcome any difficulty in maintaining their interest in their school work.

And I want to say one more thing, and with that I am through. I do not admit at all what the newspapers prove to us every once in a while about the grades, even in the high schools, not being able to spell, and that modern education is vastly inferior to the old-time district school. The boy that goes through high school now receives an education that is quite comparable to that which his grandfather got in college. Laboratory equipment is avail-

able now in all our important city high schools, and the education obtained there is vastly superior to that obtained in our universities not so very long ago. We are going ahead. We have been going ahead in the right direction. We know that our world is in a crisis that demands all kinds of biological knowledge until it can get its head level again. We must, for example, have the correct idea of evolution in place of the false ideas of evolution that have been partly responsible for making such havoc in the last few years.

The Chairman: I should be very glad indeed to have any questions asked, or any brief remarks made, and I am going to take the liberty, without consulting him in advance, of asking Professor Caldwell if he has anything to say in relation to this subject.

Professor Caldwell: *Mr. Chairman:* When one more year has passed, it will be twenty-five years since I first taught high school. I have never been in a school since that time, of any sort, high school, university, college, or normal school, in which I did not have some relation to the teaching of biology. That is an evidence of the extent to which I believe in that subject. I believe in it thoroughly. If, however, we had time (as we have not), there are two or three questions which it seems to me it would be profitable for us to raise concerning this situation. It is about fourteen years since you, here in New York, were called upon to make a statement for your administrative officers concerning the place of biology in the public high school. At about that same time others interested in the whole science program, as you were, were making other statistics to try to find out if there was any more efficient way of teaching our science than we then had. I visited in one year, thirteen years ago, twenty-two schools in which experiments were being tried out in general science. I made careful records, and saw enough to make me think that it was perhaps wise to make further experiments in the reorganization of elementary science teaching, so as to secure a more effective teaching of it. As I said before, there were at least twenty-two schools which I visited, and all of these seemed to have but one view, that of trying to make science more valuable to the pupil, and that was the most commendable thing about it. It has been particularly interesting to me to hear the discussions

at these two meetings which I have attended, in which the chief opposition to such experiments have come from those who have not attempted to work out the problem. That is something we ought to think about. I believe in biology, and I should regard it as a most serious thing if any administration were to try to work out a course of study without it.

The Chairman: There are two or three things which I think we should all keep in mind in the discussion of any question bearing upon Secondary Education. The first point I wish to refer to is the demand for making education practical. This seems to me to come more and more, not from inside the schools, not from professional men, but from business men, and as commonly used, the word "practical" means that we should teach pupils something they can use in commercial business. I need only refer to the demands for *commercial* arithmetic, *business* English, *commercial* geography, such purely occupational subjects as bookkeeping and stenography, and many other subjects. It seems to be lost sight of entirely that some will enter the professions of law; some medicine; some the ministry; and some of our high school graduates are going to become teachers, or authors, or historians, or scientists. We are apt to lose sight of these things, but they should always be kept clearly in mind when we discuss the question of making education practical.

My second and final point seems to me exceedingly important. Almost all the speakers here this evening have laid emphasis upon the content of the course of study. I would like to emphasize the fact that it is not so important what information you give to the student, as it is that you bring before him as many as feasible of the various subjects in which one may become interested, *for the purpose of enabling the pupil, early in life, to find out what that one thing is which interests him more than anything else;* to help him to ascertain that which will prove to be his major interest in life. There are many persons who never discover that until too late, and yet it is the most essential element in success. It is important, therefore, to arrange our course of study with that in view.

The Brooklyn Botanic Garden was established in order that it might be helpful in the work of primary and secondary, as well

as advanced education in the City of Greater New York. I am sure that we shall be highly gratified if the outcome of this conference shall prove to be a positive, substantial contribution to this cause.

STATEMENTS OF HIGH SCHOOL PRINCIPALS AS TO THE VALUE OF GENERAL BIOLOGY IN THE HIGH SCHOOLS OF GREATER NEW YORK

In order to secure a full canvass of the opinion of High School Principals of Greater New York as to the value of General Biology, a letter was sent to all principals not present at the Conference on April 4, reading in part as follows:

"It has been generally reported that the majority of high school principals are either hostile or indifferent to the inclusion of elementary biology as a required subject in the high schools of Greater New York. The opinions expressed last Friday evening raise a grave doubt as to the accuracy of such an opinion and there is a considerable body of individuals, having no official connection whatever with the public school system of the City, who are very earnestly interested in the status of elementary biology as a high school study.

"These are the individuals at whose suggestion the undersigned called the conference at the Botanic Garden, and it has been suggested to me as a further step that it would be an advantage to secure a brief expression of opinion from all the high school principals who were not present Friday evening.

"If you are willing to give me such a brief statement, I will very greatly appreciate it, and I believe that the result of such a canvassing of opinion will not only be appreciated by a large number of persons, but will help to arrive at a correct understanding of the situation, and will tend to help toward the most desirable solution of a problem which now appears to be before the Associate Superintendent of Schools for decision and final action.

"The questions on which your opinion is asked, may be worded somewhat as follows:

"1. Do you consider that elementary biology as now taught in

the New York City High Schools contributes essential information and educational discipline, and that it is fulfilling this function as satisfactorily as other high school subjects?

"2. Do you believe it would be desirable or otherwise to have general biology eliminated or greatly curtailed as now taught in the high schools?

"I would very greatly appreciate your perfectly frank reply at as early a date as convenient."

Fifteen letters were sent and ten replies were received. The following quotations are from the replies:

"I believe that elementary biology as now taught in the Evander Childs High School contributes essential information and educational discipline, and is fulfilling its function as satisfactorily as other high school subjects. I do not believe it is desirable to have general biology eliminated or greatly curtailed. This does not mean, however, that I think biology should be put upon the list of required subjects, if mathematics and language are to be elective. That is to say, there is no reason why biology should be especially required if it is the general custom to have the high school subjects elective. The present difficulty arises from the new State Law which requires civics in the first two years. I believe strongly in the value of mathematics and of a foreign language, as well as of biology. You will see, then, that the real difficulty is not with men who are opposed to biology in itself, but with those who do not know which of the subjects it is wisest to curtail, provided additional work must be brought in."—*Gilbert S. Blakely, Evander Childs H. S.*

"I have no complaint to make of the teaching of biology in this school. I have seen many changes introduced in subject matter which I believe are for the good of the pupils. I know also from testimonials given by the pupils themselves that they regard the work as interesting and valuable."—*William L. Felter, The Girls' H. S.*

"My own position is that General Science should be a subject of the first year of high school. It should, however, include much of direct practical value from human physiology and hygiene, and the laws of nutrition and growth in both plant and animal kingdoms, now taught in the course of Biology. Biology as a spe-

cific subject should be offered as an elective in the second year and thereafter, preferably in the form of several courses looking to practical and professional purposes in later life."—*Francis H. J. Paul, DeWitt Clinton H. S.*

"In my opinion elementary biology as now taught boys and girls in the City High Schools should be retained, if necessary, as a required study in the first year. It is practically required here and I find the boys very much interested in the subject. I believe that community civics and general science are fads which should not replace the biology. I am likewise in favor of classes in Advanced Biology. I should consider it a misfortune for the youth of this city if biology were in any way curtailed."—*H. A. Potter, New Utrecht H. S.*

"In February of this year, we substituted for biology a full year in general science, which has as its core biological principles and their applications. Since the time for this study has been doubled, and fundamental principles in chemistry and physics are used as the basis of the biological work, I believe that the general science functions better in this school in one year than the biology did in one-half year. Nothing I have said in this letter militates against my belief in the interest and value of elementary biology as now taught in our schools, but the conditions under which we are working here makes it essential that we make a change to adapt ourselves to the circumstances which we are obliged to meet. Our course here in general science is fundamentally a course in biology taught with greater effectiveness and with more time allotted to it."—*Gilbert J. Raynor, Commercial H. S.*

"I have watched the development of this subject in the high schools of this city for a period of more than twenty years. During this time I have not served as a teacher of biology, but for the most part as a teacher in charge of an annex or as principal of a high school. It is my opinion that no subject of the high school curriculum has contributed more essential and valuable information than has biology. There are certain phases of educational discipline in which, I suppose, biology is excelled by such subjects as Latin, algebra, and geometry. It seems to me that the chief value of biology lies in its informational rather than in its

disciplinary character. I believe it would be decidedly to the disadvantage of our high schools if the subject of general biology were eliminated or greatly curtailed. In our own school we have substituted general science for elementary biology in the first year of the technical course for boys. We would not have been willing to do this, did not the subject of general science include a large body of the essentials of elementary biology."—*Frank Rollins, Bushwick H. S.*

"I am of the opinion that biology, as taught in this High School, is as desirable a subject as could be offered to girls. We are experimenting with general science in a few classes, but giving it a strong biological trend. It certainly would be a great mistake to eliminate general biology, or to put it on such an elective basis as to result in its virtual elimination. I am talking with reference particularly to girls. With reference to boys, I am inclined to think that a general science course may have certain advantages over a purely biological course; especially in consideration of the fact that we have the hygiene work for all classes that do not have biology. I may add, too, that for girls as well as boys this hygiene work supplies a certain amount of the knowledge that we want the pupils to get in connection with their biology. Boys have such a natural interest, as a rule, in mechanical devices and chemical and electric operations that they ought to have a fairly early taste of that kind of thing. A few girls have that same interest; but for girls no subject comes nearer home than the subject which takes up their bodies, health, prevention of disease, and general life problems."—*Stuart H. Rowe, Wadleigh H. S.*

"I consider that elementary biology as now taught in New York City High Schools contributes essential information and educational discipline to all students who seriously and enthusiastically pursue the subject. It is fulfilling its function as satisfactorily as other high school subjects for such students as are or as become thoroughly interested in biology. For such as are not interested and can for themselves see no value in the subject, biology as now taught offers nothing of value in the way of essential information or educational discipline, and in this respect it does not differ from other high school subjects. I believe that biology should not be required of all students, but that an opportunity

should be given in an introductory general science course which will enable the student to determine his interest and desire to pursue the subject further, in which case he should have the opportunity to elect work in biology. In this school one term of our general science course is taught by biology teachers, and if at the end of that term a considerable group have developed sufficient interest in biology to make it seem likely that they will receive either 'essential information' or 'educational discipline,' courses in general biology will be organized for them."—*Horace M. Snyder, Manual Training H. S.*

"At Stuyvesant High School, which makes a specialty in applied sciences, especially in the fields of physics, chemistry, and engineering, the chief science of our first term is shop physics and chemistry; in our second term we have a course in physiology and hygiene. The subject of biology is not regularly taken up in this school until the fourth year, when it is presented in a form suited to the needs of students planning to enter the professions of dentistry and medicine. I am, therefore, not in a position to state from actual experience what might be the value of the study of biology to boys in the first year of high school living in the crowded district in the lower East Side of New York. It seems, however, that in such an environment as this, in which everything biological except man tends to be suppressed, the study of biology in fields other than human physiology would lose much of its inspiration and charm. If our school had the environment of a suburban town, or even of the more spacious outskirts of our city where home gardens and animal pets are commonplaces, I should feel that biology would be an essential subject in the lower terms of the school."—*Ernest R. von Nardroff, Stuyvesant H. S.*

"Personally I feel that, while the biology is important, considering the environment in which our pupils live, a course in general science, satisfactorily developed, would be of greater value and importance. I realize fully that thus far this subject of general science has not been completely and successfully defined. Nevertheless, there is a general feeling as to what it should accomplish, and I am convinced that sooner or later we shall find a way of carrying out our aims. Furthermore, as has already been

indicated on a number of occasions, there is a strong and insistent demand upon us for the development in our pupils of a realization of their obligations to the community; and, to an extent, of a proper realization of the social and economic environment in which they live. Furthermore, there is a strong and insistent demand that we devote more and more time to the development of the physical well-being of our high school students. All these things, namely, the call for a course in general science, the call for a course in the study of the social and economic environment of the child, the call for the physical development of the child, indicate that biology will ultimately have to give way."—*Arthur M. Wolfson, The High School of Commerce.*

CONFERENCE ON POTATO DISEASES ON LONG ISLAND

An important meeting of potato pathologists was held on Long Island during the week of June 24–28. Potato growing is one of the most important and extensive industries of the Island, and here, as elsewhere in potato growing, eternal vigilance and strict attention to the advice of plant disease experts, or "plant doctors," is the indispensable condition for a successful crop. There are a score or more of diseases to which potatoes are susceptible, and this conference was specially devoted to the so-called "degeneration diseases," mosaic disease, leaf-roll, and curly dwarf. The meetings of June 24–25 were at Riverhead, L. I., and nearby farms and gardens.

Specialists were in attendance from the Federal Horticultural Board of the United States Department of Agriculture, and from agricultural colleges and experiment stations of various states. Foreign specialists include Dr. H. M. Quanjer, of Wageningen, Holland; Dr. A. D. Cotton, of the Royal Botanic Gardens, Kew, England, and Dr. George H. Pethybridge, Pathologist, Royal College of Science, Dublin, Ireland, and Mr. P. A. Murphy, Charlottetown, P. E. I.

The potato disease projects are under the general supervision of the following Advisory Board: Leaf roll disease, Mr. P. A.

Murphy, Charlottetown, P. E. I.; Mosaic disease, Dr. H. A. Edson, U. S. Department of Agriculture, Washington, D. C.; Seed treatment, Dr. I. E. Melhus, State Agriculture College, Ames, Iowa; Spraying, Dr. G. R. Bisby, Experiment Station, St. Paul, Minn.; Seed certification, Dr. W. A. Orton, Federal Horticultural Board, Washington, D. C.

The program for the week's meetings was arranged through the joint efforts of the Advisory Board, the Committee on Arrangements, and the County Agricultural Agents of Suffolk and Nassau Counties, Long Island. On Friday, June 27, at 8:30 p.m., a conference for reports and discussion was held at the McAlpin Hotel, and on Saturday, June 28, an all-day meeting was held at the Brooklyn Botanic Garden, in conjunction with the Northeastern Association of Plant Pathologists. The morning and afternoon sessions, in charge of Dr. C. R. Orton, were devoted to discussions of diseases of beans, cabbage, cucumbers, tomatoes, and other crops, and a portion of the afternoon was given to an inspection of the laboratories and plantations of the Brooklyn Botanic Garden.

BERTHA M. EVES

We record with deep sorrow the death, on June 4, 1919, of Bertha M. Eves, secretary of the Brooklyn Botanic Garden since January 1, 1911. The appointment of Miss Eves was the first after that of the director, and for three years, or until 1914, she acted as librarian as well as secretary. During her entire connection with the Garden she filled a difficult and responsible position with ability and conscientious devotion to the interests of the institution which she served. Having been with the Garden practically since its establishment she was familiar with its entire organization and history in detail, and for this, as well as for personal reasons, she will be greatly missed. At its meeting on July 17, 1919, the Botanic Garden Governing Committee directed the secretary to enter in the minutes of the meeting, and to extend to the bereaved mother and family, expression of their sorrow at her loss, and of their appreciation of her valuable services to the Botanic Garden.

NOTES

According to *Nature,* Casimir De Candolle, the well-known Swiss botanist, died at Geneva, on October 3, 1918. He was the third generation of botanists in the same family. It was his grandfather, Alphonse Pyramus, who initiated the monumental *Prodromus Systematis Naturalis Regni Vegetabilis,* and carried it through the seventh volume. Volumes 8–17 were by his son, August, father of Casimir.

A new association, the *Agricultural History Society,* was organized at Washington, D. C., February 14, 1919. The object of the society, as stated in the constitution, is "To stimulate interest, promote the study, and facilitate the publication of researches in the history of agriculture." This is one of several illustrations of the growing interest in the United States in the study of the history of science. Several books and articles have recently appeared on the subject, and one of those most active in promoting this study is Professor George Sarton, of Belgium, and editor of *Isis,* a magazine devoted to the history and philosophy of science.

The Appalachian Mountain Club held their outing of March 22 in the Japanese Garden and Prospect Park. The party under the guidance of Mr. William Patterson was met at the north Flatbush Ave. gate by Dr. Gundersen of the Garden staff, and conducted through the Japanese Garden, Rock Garden and other portions of our grounds.

On Tuesday evening, March 25, an exhibition of four motion picture reels of plant life was held in the lecture room under the joint auspices of the Torrey Botanical Club and the Botanic Garden. In addition to popular films showing the strawberry industry in Kentucky and the forest planting at the source of the water supply of Portland, Oregon, there were two other films—one showing how girdled fruit trees may be saved by bridge grafting, and the other showing the penetration of the tissue of a potato tuber by the filament of the parasitic fungus causing the disease known as "Potato Leak." The films were explained by Dr. R. B. Harvey, Dept. of Agriculture, Washington, D. C.

The journal *Isis* devoted to the history of science has resumed publication according to a letter from the editor, Dr. George Sarton, in *Science* for February 14. This valuable journal was forced to discontinue publication during the war.

We learn from the *Journal* of the Kew Guild that Major James Leonard Veitch, M.C., son of Mr. Peter Veitch of the famous Exeter firm of horticulture, was killed in action in France on May 21, 1918. The same number of the *Journal* (Vol. III, No. 26) contains an interesting letter from Mr. Louis Gentil, written from Brussels under date of January 17, 1919, reading in part as follows:

"It would fill several copies of the *Journal* to recall all the mischief done by the German occupation. The Botanic Garden of Brussels has suffered very much for want of coal. Seven houses were emptied, the large Winter Garden with all the Tree-Ferns had to take care of itself as far as heating was concerned. The general collection of plants is considerably reduced. The Germans did not rob us of plants or herbarium specimens, but all the coffers have been stolen. The copper (about 4,000 lbs.) covering the dome of our large building was taken. They also took our waterpots, syringes, pulverizator, and all copper material. We reduced to a minimum the outside floral display, replacing it with vegetables.

"You have probably read in the papers that a few Flemish rascals joined the Germans to disjoint the Belgian people in two parts, French and Flemish. The Botanic Garden was specially marked by these fools. The French language was prohibited, our copper and rubber stamps were confiscated. Our letter-paper and envelopes were printed in Flemish. All the labels of the trees and shrubs were taken off because the French name of the plant was mentioned. All the members of the staff were compelled to speak Flemish and I, who cannot understand Flemish, was in the way to be dismissed and sent to the French part of the country.

"M. Rockens (Kew, 1900), who is Flemish, received special attention. The renegades offered him an increased salary of 2,000 f. a year if he would accept the post of Professor to the Flemish School of Horticulture. He refused. Since the great

day of King Albert's return here, we speak English, and the people will soon pick up the language, because the contact between the people and the army is permanent. You cannot imagine the enthusiasm which prevailed here when the English, French, and American troops marched in." Mr. Free, our head gardener, is a member of the Administrative Committee of the Kew Guild.

The Garden library has recently received a copy of "*The War Garden Victorious,*" by Charles Lathrop Pack, President of the National War Garden Commission. The book is "dedicated to the War Gardeners of the United States and Allied countries in admiration of their success in adding to the World's supply of food during the World War." The volume is fully illustrated and is an interesting and valuable record of the work of the National War Garden Commission. It is not offered for sale.

Dr. Ernest A. Gaumann, who is on his way from Switzerland to Buitenzorg to enter upon his duties as a member of the staff of the Botanic Garden at that place, was a caller at the Brooklyn Botanic Garden on April 24.

Camillo Schneider, of Vienna, well known in the botanical world for his studies of woody plants, visited the Garden on May 6. Mr. Schneider's botanical explorations in China were interrupted by the war, and he has been pursuing investigations at the Arnold Arboretum during the past year.

Callers at the Botanic Garden during March and April included Mr. Masayasu Kanda, Professor of Botany in the Higher Normal School, Hiroshima, Japan, and Mr. Taigan Matsunami, Professor of Pedagogy in the Nara Female Higher Normal School of Japan, both of whom are on a mission from the Japanese Government to visit scientific and educational institutions in this country and in Europe.

The marriage is announced of Miss Jean A. Cross, since July 1, 1915, assistant curator of elementary instruction in the Brooklyn Botanic Garden, to Mr. Emil Ernest Weis, on March 29,

1919, at Paris, France. As noted in the *Record* for April, 1919 (p. 26), Mrs. Weis has been in France on leave of absence from the Botanic Garden since January, 1919, for reconstruction work, especially in connection with gardening, having sailed with the Wellesley Unit.

Miss Philura H. Brower, for over eight years secretary to the School of Fine and Applied Arts of Pratt Institute, Brooklyn, was appointed acting secretary of the Botanic Garden, beginning June 2, 1919. At the meeting of the Botanic Garden Governing Committee, July 17, 1919, her appointment as secretary was authorized, to take effect on August 1, 1919.

North-Eastern Mycological Club.—There was organized at Ithaca, on June 5, 1919, the North-Eastern Mycological Club, with about 15 charter members. The proposed purpose of the club is to stimulate the collection and exchange of fungi in general, both saprophytic and parasitic. The organization followed several days of enthusiastic work in collecting and identifying specimens of fungi, participated in by representatives of Cornell University, the New York Botanical Garden, Syracuse University, and the Brooklyn Botanic Garden. It is planned to hold similar collecting trips at intervals, in regions where several days may profitably be spent.

Dr. W. G. Farlow, since 1879 professor of cryptogamic botany in Harvard University, died on June 5, 1919. Dr. Farlow was the recipient of honorary degrees from Harvard, Strasburg, Glasgow, Wisconsin and Upsala; he was also one of the editors of the *Annals of Botany,* published in England. In May, 1918, the Brooklyn Botanic Garden acquired by exchange from Professor Farlow over 220 herbarium specimens of parasitic fungi, and in November, 1917, he presented the Garden with a copy of Farlow and Seymour's "Provisional host index of the fungi of the United States," Parts I–III, complete. This is a rare publication and invaluable in plant disease studies.

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BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the *Annual Report* of the directors and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy.

MEMOIRS. Established, July, 1918. Published irregularly. Volume I, *Dedication Papers:* comprising scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. Price $3.50, plus postage.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

10. *Inheritance studies in Pisum. I. Inheritance of cotyledon color.* 18 pages, 4 tables. 1916.

11. *Studies of teratological phenomena in their relation to evolution and the problems of heredity. II. The nature, causes, distribution and inheritance of fasciation with special reference to its occurrence in Nicotiana.* 29 figures, 30 tables. 1916.

12. *Endemism in the flora of the vicinity of New York.* 10 pages. 1916.

13. *The origin of new varieties of Nephrolepis by orthogenetic saltation. I. Progressive variations.* 28 pages, 6 plates. 1916.

14. *A white-cedar swamp at Merrick, Long Island, and its significance.* 10 pages, 5 plates. 1916.

15. *Present status of the problem of the effect of radium rays on plant life.* 8 pages. 1916.

16. *Flora of the vicinity of New York.* 6 pages, fig. 1. 1917.

17. *Endophyllum-like rusts of Porto Rico.* 9 pages, 3 plates. 1917.

18. *Inheritance of endosperm color in maize.* 11 pages. 1917.

19. *Studies of inheritance in Pisum. II. The present state of knowledge of heredity and variation in peas.* 102 pages. 1917.

20. *Inheritance studies in Pisum. III. The inheritance of height in peas.* 7 pages, fig. 1. 1918.

21. *A sketch of plant classification from Theophrastus to the present.* 16 pages. 1918.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each.

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BROOKLYN BOTANIC GARDEN

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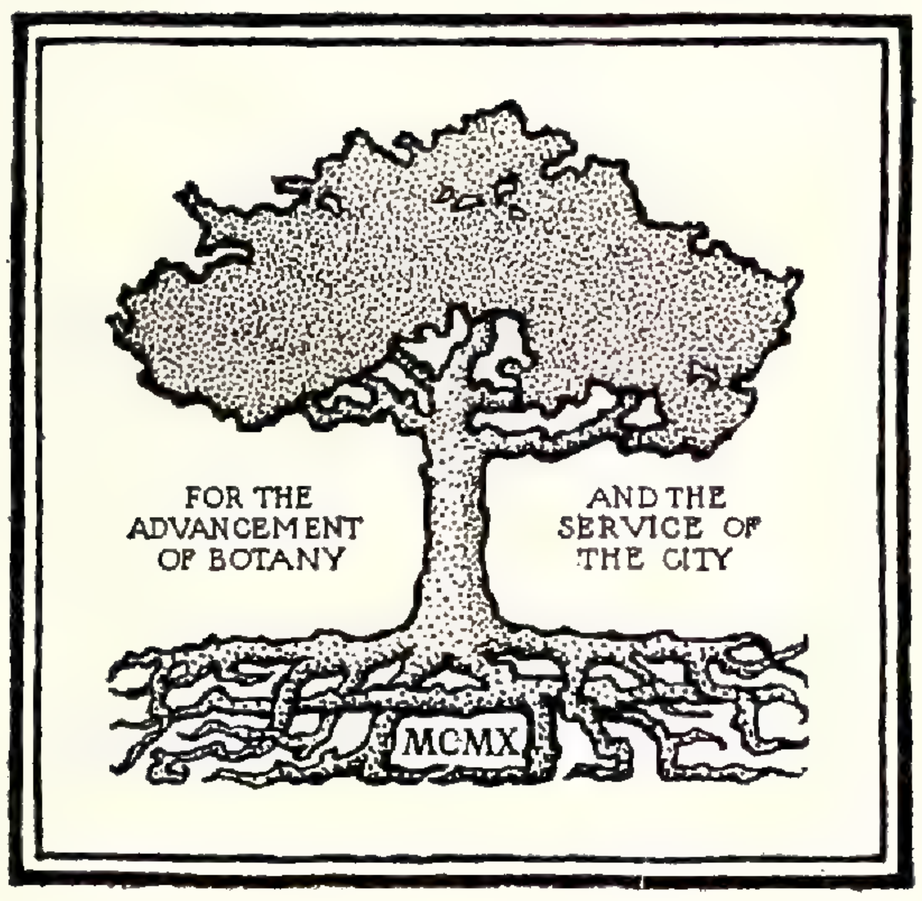

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FIG. 10. Sixth annual children's garden exhibit. Partial view.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. VIII October, 1919 No. 4

CHILDREN'S GARDENING IN THE RECONSTRUCTION PERIOD*

One morning last week we were awakened by the news that the Great War is over. This meant to the thinking man and woman not only the end of the greatest catastrophe this old world has ever seen, but it meant that we have crossed the chasm and come to stand on the borderland of a new world—a world that surely will be new socially, politically, industrially, educationally, morally, and religiously. It meant that the time had come for speeding up the great re-building, the radical reconstruction, of a large number of human affairs which have been developing slowly during the long era of civilization.

World reconstruction has now begun. In America it is perhaps truer to say that our own problems are concerned with readjustments rather than reconstruction. Nevertheless, very many radical readjustments are necessary, and it behooves the leaders of every helpful movement to survey its past failures as well as its successes, and then make the rich experience of the past guide through the mazes of the problems of the future.

It is with this attitude that I ask you to join with me in a rapid examination of the possible contribution of the children's gardening movement to the coming great work of making better citizens for a reconstructed world.

* Address at the graduation of teachers of children's gardening, Brooklyn Botanic Garden, November 23, 1918.

What have we aimed to do educationally with the children's gardens of the past, and what have we really succeeded in doing? I look first for an answer from the foreign lands whence came the idea of school or educational gardens; and this is what I find in the historical story:

Some great educational leaders, notably Comenius, Rousseau, Pestalozzi, and Froebel, advocated children's gardens for educational purposes. In the first half of the nineteenth century, the school authorities of several of the old German states introduced gardening in connection with rural schools, and later provided gardens for pupils of many city schools. The original aim in the rural schools seems to have been vocational, that is, to teach the art of growing plants as a trade or business; but it is doubtful whether this was even the aim in the larger communities which were not strictly agricultural. Certainly, a few years ago visiting educational investigators could find no evidence of vocational aims and results in the city school gardens of Germany. On the contrary, the gardens appeared to have been conducted for general educational purposes, chiefly for nature-study, and perhaps for recreation. There was little emphasis on the manual training possibilities and on useful products of the children's gardens. In several German cities the importance of children's direct participation in gardening was overlooked, and the gardens became ordinary botanical gardens for nature-study observation and for supplying materials for schoolroom use.

Apparently following the example of German gardens, the national education system of Sweden, Austria, Belgium, Holland, France, Switzerland, Italy, and Russia have given more or less official encouragement to school-gardens within the past sixty years. In these countries the rural schools have as a rule been selected for gardens, and in the beginning the official aim seems to have been entirely vocational. Switzerland has required special training in gardening in the normal schools, and since 1885 has subsidized elementary school-gardens. For several decades every rural school in Belgium has had a garden, and the elementary training in gardening is believed by many educators to have been invaluable in relation to the horticultural industry of the country. The normal schools of France have long taught

agriculture and gardening, gardens were officially provided for, and several years ago it was estimated that about fifty thousand French schools had gardens. However, many American observers have questioned whether a considerable proportion of these French gardens have been of much educational value to the pupils; but some of them have helped reduce the schoolmaster's cost of living. In Holland, the gardens for small children are apparently for nature-study, rather than for training in the business of gardening as originally intended in other countries where official interest was based entirely upon vocational considerations. Fifteen years ago there were only a few dozen children's educational gardens in Great Britain, and these were not officially connected with the school system, but since 1904 gardens have been encouraged by special grants to the schools. Many gardens have been established in connection with English elementary day schools and also in evening schools for pupils who must work during the day. In the day schools the nature-study aims seemed to prevail. England has often been criticised for slow development of school-gardens, but it should not be forgotten that a widespread popular interest in home gardening has probably been a good substitute for the average of the school-gardens officially established on the continent of Europe and often of very doubtful efficiency.

Thus rapidly surveying the history of children's gardens in connection with European schools, it seems clear that while originally and officially most of them were planned and defended on vocational grounds, that is, as preparation for the vocation of agriculture in its plant-growing phases, there has been a decided tendency towards gardening for general educational or agricultural ends, in fact as one of the best phases of what, in American elementary schools, we call nature-study.

Turning now to America, most of the children's educational gardens in the United States and in Canada have been organized during the past twenty years. Among the pioneer gardens which attracted general attention were the wild-flower garden at Roxbury, Mass., in 1891; the gardens of the National Cash Register Company at Dayton, O., 1897; the garden of the Hyannis (Mass.) Normal School, 1897; the home gardens at Cleveland, O., 1900;

the Hartford (Conn.) School of Horticulture, 1900; the gardens at Hampton Institute (Va.), about 1901; and the Children's School Farm in New York City, 1902. We note that none of these were officially related to schools; in fact, most so-called school gardens have been organized by individuals or organizations independently of official connection with the schools. As examples of such outside encouragement are the gardens established by the following: Home Gardening Association of Cleveland, Massachusetts Horticultural Society, Twentieth Century Club of Boston, Woman's Institute of Yonkers, Massachusetts Civic League, Missouri Botanical Garden, National Cash Register Company, Vacant Lot Cultivation Association, United States Department of Agriculture, numerous local agricultural societies, and the Park Department of New York City. In very few cases before 1910 did boards of education help officially by providing funds; but in many schools gardening was regarded as important work, supplementary to or a substitute for nature-study.

With regard to the aims of the common types of American gardens, I have found little suggestion in printed descriptions of their operation, and still less in my own observations, to convince me that they were intended to be or succeeded in being, vocational, that is, trainers of future gardeners. On the contrary, it seems to me that the leading American school gardens have always been of general educational value along nature-study lines. They have made the children interested in useful plants, they have led to aesthetic appreciation of plants, they have given a glimpse of the relation of plants to human life, they have given training in observing nature for the joy of learning facts. In short, the typical American garden has been a most successful nature-study laboratory.

A new aim for children's gardens has been introduced by our government's movement for war gardens during the years 1917 and 1918. It is that children's gardens should be made to contribute to the food supply. I notice the computation that five million children might next summer raise $50,000,000 worth of the food that beyond doubt will be much needed in this war-stricken world. This line of encouragement deserves hearty approval if it leads to a vast increase in gardening by children,

but I hope sincerely that those who direct the war garden work of the children will not forget that gardening for food production is probably a response to a more or less temporary demand, but gardening for education is permanent. A $10-producing garden may be made of much greater educational value than any other teaching which can be provided at the cost of as many dollars. I urge, then, that, while we should go on encouraging food production and the resultant interest in the world's great food problems, we should not forget to develop the educational values of gardening as conducted by trained teachers. If you want only maximum food production in children's gardens, then I advise you not to employ a trained teacher, who is worth a good salary; but let me send you an illiterate foreign gardener who can show the children how to get good crops. However, you must remember that this man will be no more of an educator than were the first American gardeners, the primitive American squaws who showed their daughters how to plant maize which, as Indian corn, is today the undisputed king of the cereals.

I can not believe that we have use for gardeners who merely show children how to grow crops when it is possible to have teachers who will make the lessons in gardening mean much more than simple manual activity. Therefore, while I stand squarely with the official movement for the greatest possible food production in children's gardens under existing food conditions, I urge that directors of such emergency gardening should not forget to develop the educational possibilities which are the permanent justification of children's gardens.

I have attempted to survey and analyze the children's garden movement up to the present time in order to point out some of the chief educational values needed in the future. I believe that we have learned from experience that the garden for children is to be regarded primarily as an educational apparatus, just as books and maps and blackboards and science laboratories are materials for use in instruction. As I look over the educational good that has come irregularly and uncertainly from the children's gardens of the past, I have a vision of gardens of the reconstructed or readjusted future which will give constant and certain contributions to the making of good citizens. To this end

the gardens of the coming era must be made to influence the children in many definite ways: They must make children interested in plants as they affect human life through the food supply of man and the useful animals. They must make children interested in plants as things of beauty which add to the pure joy of living in this old world, which has superabundant sorrow and needs all the beauty that nature can give directly or through the aesthetic arts and literature. The gardens must put children into direct touch with useful labor and develop a sense of satisfaction in learning to do well any necessary or useful manual operation. They must make children learn to enjoy the great health-giving and happiness-producing world out-of-doors. They must contribute to the development of many little but important habits of mind and body, such as responsibility for one's own work, energetic movements, clear seeing and logical thinking, recognition of the ethical rights of other people, community interest, and many others for which numerous opportunities come in garden work conducted by good teachers. These are some of the greatest educational values which we must aim to develop regularly and systematically in children's gardens.

In closing, I have just one central thought to leave with the students of the Brooklyn Botanic Garden who are today completing their course of training for teachers in children's gardens. It is this: The primary purpose of children's gardens is not to produce useful plants, it is not to train professional gardeners, but it is to use the scientific methods of gardening as a very practical basis for important phases of cultural and useful education. The great children's garden movement, guided along such lines, is destined to play well its part in our national readjustments and reconstruction in the ways and means of making children into citizens fit for an ideal democracy.

MAURICE A. BIGELOW.

SIXTH ANNUAL GARDEN EXHIBIT FOR BROOKLYN BOYS AND GIRLS

The Sixth Annual Garden Exhibit for the boys and girls of Brooklyn was held on September 20 and 21 in the rotunda of the

Laboratory building. Just stating this fact means nothing! But when one entered the front door of the building and stepped into the rotunda, he would almost have thought that this array of vegetables, potted plants, cut flowers, window boxes, canned vegetables, garden charts, pictures and diagrams was a part of a real country fair exhibit. The rotunda itself made a wonderful setting for the children's exhibit. Many a person, who came to view the products, could scarcely believe that this was work done by children. Everything in the exhibit was either the direct or indirect work of the young exhibitors. About ten thousand children of this borough entered into this exhibit. It hardly seems believable that from the small beginnings of six years ago there could have come such a fine display! This year's exhibit represented the tireless efforts of years of training boys and girls and schools to exhibit properly.

The standards used are exactly the same as those used for adult displays. Every vegetable has to be cleaned and polished. A child must bring exactly the right number of beets or asters, let us say, or his exhibit is thrown out. To illustrate this point, let me say that Friday, the nineteenth, was supposed to be the day when all the exhibits were to be brought in, and at four o'clock that afternoon they were to be judged; but on Thursday the first exhibit came in. This exhibit consisted of one small boy very much excited and very hot, who held in his hands a paper bag. Inside of it were seven green tomatoes and one red one. When he was told that the red tomato, the black sheep of the flock, would spoil his entire exhibit, and that he should have had eight green ones, all of the same size, he was quite nonplussed. He measured up his tomatoes with his eye and finally said that he would get that other green tomato over here before the judges came the next day, and so he did. Just this one example shows the seriousness with which the boy and girl of our elementary school takes the exhibit. I believe that if such a display had been held in some little city or country town almost every man, woman and child would have been there, but unfortunately for the boys and girls and for their display, Brooklyn is such a large city that it is difficult to build up any feeling of united interest. We are doing it steadily year by year with the boys and girls, but the adult is more difficult to arouse.

The first view of the exhibit was a picture in itself. One of the judges said he had never seen a handsomer picture at any exhibit he ever judged, and he had judged many. The tables ran through the center of the rotunda forming an H; in the four corners were tables fitted in V shape. The decorations were oak leaves. The first table was covered with the products from P. S. 152, in all a very dainty and charming exhibit. P. S. 98's exhibit filled up the cross piece of the H, and was largely made up of vegetables and flowers, wonderful exhibits from the Sheepshead Bay section of the city. P. S. 89 won the first trophy in this class, and their exhibit was at the end of the H—not in as prominent a position, but such an exhibit needs no special prominence. This exhibit was unusually interesting because it was so well named and labeled, and because it represented so many different activities in the school. There was a little herb exhibit; an exhibit of canned products, many of the vegetables having been canned by boys; another of peanuts taken from the ground just as they grew; and more other exhibits than one can mention here.

On the corner tables in the rotunda were the exhibits from the children's gardens of the Park Department, and some very interesting window boxes from P. S. 41, 43, and 49. P. S. 49 took the first prize in this exhibit, and P. S. 43 second prize. This is one of the largest schools of our borough and is in one of the most congested districts. Every single window box in their exhibit was made by the boys of that school in their workshop. It seemed one of the most interesting exhibits considering the natural drawbacks of that section.

The park gardens, McCarren Park, Betsy Head, Fort Greene, and Highland Park, showed very fine vegetables. The sweet potatoes from McCarren Park, the first prize winner in this class, received universal attention. The best placed exhibit of all was that of Betsy Head Park.

P. S. 162 sent in their exhibit arranged in a rather unique way. They had large trays filled with vegetables, the product of individuals' gardens. Each individual arranged his own tray. We never had an exhibit set up in exactly this way before. It was pleasing and effective. P. S. 82 sent in products from their

school garden, which had been supervised throughout the entire summer by a teacher appointed by the Board of Education. This work is under the general direction of Mr. Van Evrie Kilpatrick. A number of other schools, old exhibitors, are supervised in the same way as P. S. 82.

Unfortunately the rotunda was not adequate for the placing of all of the individual displays, so these were in another room. They represented all the single entries of the individual boys and girls, with the exception of the backyard garden display. Perhaps the most interesting work of all came under the head "Backyard Gardens." The best backyard gardens planted and taken care of by boys and girls of this borough receive prizes in War Stamps. The first prize is three War Stamps; the second, two War Stamps; and the third one stamp (the equivalent of five dollars). Each year sixty to a hundred boys and girls enter this contest. Their gardens are visited three times during the summer by members of the staff of the Botanic Garden, and each time some gardens are ruled out of the contest for good and sufficient reasons. The boy or girl is always told why he is being dropped out. At the end of the season the contestants get warmer and warmer, until finally, two days ahead, you see the boys and girls rushing in with their plans, diagrams, lists of amount of money spent, and amount of money taken out of the garden. I wonder if any man or woman could do any better than young Carl Klostermaier, who spent $2.67 on his garden 35′ × 60′, and took out of it $106.60. Pretty good! Or would you like to have been Anita Cooper, who took a big, weedy, vacant lot 100′ × 100′, and canned, and canned, and canned all summer long? You should see the ears of corn she has taken from that garden, and all sorts of other good things!

The rest of the individual displays were in classes for vegetables, flowers, potted plants, pressed wild flowers and pressed weeds. The classes for pressed wild flowers and weeds and that of the backyard gardens, represent the three classes in which most of our high school boys and girls make their entries.

The great benefit derived from such an exhibit is not only that of creating public interest and understanding, but the exhibit always creates in the minds of the individual boy or girl and of

the individual school teacher a new basis of judgment for his or her work. You cannot look upon an exhibit of another person and that of your own and not see points on how you can do better work. Fortunately those who enter into our exhibits are good losers and good winners. Those who lose realize the reasons why they lose, and those who win also know that the next year will mean a renewed effort if they are to continue with their high standards of work.

The judges of this exhibit are always chosen from people who not only know for what the work of young people stands, but who also realize the right standards of judging. This year Mr. A. L. Miller, who is a professional florist and a judge, was chairman of the judging committee. Mrs. George E. Paul, of the National Plant, Flower and Fruit Guild, frankly claimed that she knew boys and girls better than she did plants, but we always need someone on this committee who appreciates the efforts of the individual children. Mr. Montague Free, head gardener of the Botanic Garden, was the third judge. No person is ever chosen to judge the exhibit who knows any of the children, teachers, or schools. In this way we can hold an impartial exhibit. The prizes for the individual efforts are silver and bronze medals.

ELLEN EDDY SHAW.

ADDITIONS TO THE HERBARIUM

During July the Garden purchased from Mr. Camillo Karl Schneider his personal herbarium of woody plants, collected by him during his residence of the past three years at the Arnold Arboretum. This collection, of approximately 6,000 specimens, comprises nearly all the species growing at the Arboretum. Each specimen bears the accession number of the Arboretum, and has been determined by the collector. Mr. Schneider, the author of "*Illustriertes Handbuch der Laubholzkunde*" (Jena, 1916) made the collection originally for his personal use, and it is one of the most valuable herbaria of woody plants in New York.

On July 2 the Garden received from Miss Fannie A. Mulford, Hempstead, L. I., as a gift, her private herbarium, together with various books, note-books, and other records. The collection

comprises about 4,000 specimens, and is especially rich in Long Island and local flora material.

On July 3, 1919, Mrs. Elizabeth H. Reichling, 298 Greene Ave., Brooklyn, presented to the Botanic Garden the fungus herbarium of her son, Gerard Alston Reichling, as a memorial to him. Mr. Reichling was instructor in German in the Extension Teaching department of Columbia University, in 1914–16, and was an amateur collector and student of fungi. His collection numbered 1,287 specimens of fungi and seven specimens of mosses.

NOTES

Mr. Free, head gardener, acted as judge at the annual dahlia and vegetable show of the Philipstown Garden Club, near Cold Spring-on-Hudson, on October third. On July 28 and 29 Mr. Free was in Rochester, where he secured cuttings of many varieties of lilac through the courtesy of the Rochester Department of Parks, of which Mr. John Dunbar has for many years been the efficient horticulturist. Highland Park, Rochester, contains what is doubtless the most complete collection of varieties of the common lilac to be found in North America. It is reported that on "Lilac Sunday," which occurs about the last of May each year, as many as 50,000–60,000 people visit the collection.

Appreciation by Public Schools of what the Garden is doing for the Children.—The following letter, dated March 13, 1919, has been received by the curator of elementary instruction from a teacher in Public School No. 148, Brooklyn: "The demand for courses at the Botanic Garden is ever increasing among the children of Public School 148. I have turned down very many children each week. It has gotten so now that the parents come to school and beg me to permit their children to go to the Garden to take courses. To these poor people of this dreadful district the Garden is a Paradise, something great and wonderful. I have a class of model children who have begged to be allowed to go. Could you fit them in somewhere? I trust you will be able to find some time for these children who are so hungry for the things of nature."

One of the most dangerous diseases of Irish potatoes, potato wart, has been discovered in the United States. Rough, spongy outgrowths of varying size are produced on the tubers, especially at the eyes. These warts are light brown at first, but become black and decayed with age. Sometimes all potatoes in affected hills are worthless. The disease does not attack the vines above ground. Prof. H. M. Fitzpatrick and Dr. L. R. Hesler of Cornell University were appointed special field agents of the Federal Plant Disease Survey in connection with the effort to locate this disease. They spent the past summer in a survey of New York State. It is believed that the great bulk of the infested potatoes were distributed from the port of New York.

The International Institute of Agriculture informs subscribers that the publication of its Bulletins has been interrupted owing to the general strike of printers in Rome. Publication will be resumed whenever the strike ends.

The Garden has received an announcement of a Physiological Congress to be held in Paris July 16–20, 1920, under the presidency of Professor Charles Richet. Physiologists of all allied and neutral countries are cordially invited to take part in the Congress. The Federation of American Societies for Experimental Biology is coöperating with the French physiologists in arranging for the Congress.

The British Pteridological Society has notified its members that the proposed annual meeting and excursion of South Wales has been abandoned in consequence of the impossibility of obtaining accommodations, and the threatened restricted railway facilities. Arrangements will be made for this excursion in 1920.

The Garden library has just received a circular of the University of Edinburgh, entitled "Facilities for advanced study and research in the faculties of arts, science, divinity, law and medicine," for the session 1919–20. Attractive opportunities are offered by the Department of Botany, under the direction of Prof. Bayley Balfour, and other members of the University Teaching Staff, in coöperation with the Senior Staff for Instruc-

tion in the Royal Botanic Garden. All the resources of the Royal Botanic Garden are available to the students of botany in the University. Copies of the Circular may be obtained from the Bureau of Education, Department of the Interior, Washington, D. C.

The establishment of a new Jardin des Plantes is proposed for France in the park of Versailles between the Trianon (villas of Louis XIV and XV) and the Forest of Marly. The new garden of about fifteen hundred acres will be, to a large extent, supplemental to the old Jardin des Plantes in Paris, the further expansion of which has been shut off by the growth of the city.

Dr. Kingo Miyabe, Professor of Botany at the Hokkaido Imperial University, Sapporo, Japan, visited the Botanic Garden on July 7 and 12, 1919. Mr. Miyabe was one of the first Japanese students to come to this country for advanced work in botany, and was a pupil of the late Professor Farlow, of Harvard University. He has been president of the Hokkaido Natural History Society since its establishment several years ago.

Prof. R. H. Compton, M.A., of the University of Cape Town, South Africa, has been appointed director of the National Botanic Gardens at Kirstenbosch, as successor to the late Dr. H. H. W. Pearson, who died in November, 1916.

We learn from *Nature,* through *Science,* that Mr. Lawrence Philipps has offered University College, Aberystwyth, the sum of £10,000 to found a plant-breeding institute for Wales in connection with the agricultural department of the college. He has guaranteed a further sum of £1,000 per annum for ten years towards the maintenance of the institution. The governors of the college have appointed Mr. R. G. Stapleton, who was for some years connected with the college as advisory botanist, to a chair of agricultural botany and to the directorship of the new institution.

At the annual meeting of the School Garden Association of New York, in May, 1919, the director of the Brooklyn Botanic Garden was elected one of the vice-presidents of the Association for the ensuing year.

The Okefinokee Society has recently been organized, with headquarters in Waycross, Georgia. The purpose of the society, as stated in the constitution is: First, to secure a part or all of the Okefinokee Swamp as a permanent Government Reservation; second, to coöperate with the government, scientific societies, and other agencies in using this reservation as a Natural History Museum and for a semi-tropical recreation and educational center; third, to give authentic publicity regarding the swamp, such as may promise to be of general public and scientific interest. The preamble to the constitution of the society states that the primitive esthetic character, and the great wealth of scenic and scientific attractiveness of the swamp are in danger of being lost beyond recall through continued exploitation of its timber resources. The secretary of the society is Dr. J. F. Wilson, Waycross, Ga.

Bulletin Agricole De L'Institute Scientifique De Saigon is the title of a new monthly publication received by the Garden library. The first number was issued Januray, 1919—published at Saigon, Indochina, by the Scientific Institute. From this number we learn that the Governor General of Indochina has arranged for the organization of a scientific institute "for the study, development and utilization of the productions of the soil and waters of Indochina." The agricultural and commercial activities of Cochinchina have been divided into two sections—an economic section associated with the Department of Economic Affairs at Hanoi, and a scientific section associated with the Scientific Institute of Saigon. The organization is under four departments, as follows: (1) Botanic and Zoological Gardens of Saigon; (2) Laboratory of Agricultural Chemistry of Saigon; (3) Experiment Station of Giaray, and Arboretum of Trang-Bôm; (4) Department of Rice Culture, with a station at Carthe. The Scientific Institute at Saigon includes, (5) a laboratory for the study of flora and forest products and a herbarium; (6) laboratory for the study of the diseases of cultivated plants; (7) a museum of agriculture and forestry. It is announced that the *Bulletin* will concern itself especially with the following: rice culture, caoutchouc, coffee, tea, paper, tropical oils and other textiles, sugar cane, tobacco, spices and aromatics, fruit trees, plants producing paper pulp, horticulture, forest products, and sylviculture.

The Annual Report of the director of the Botanic Gardens, Government Domains and Centennial Park, Sydney, N. S. W., for 1916, received in our library in March, 1919, contains a notice of the exercises held at Sydney on June 13, 1916, in celebration of the centenary of the Botanic Gardens. Addresses were delivered by His Excellency the Governor and by Mr. J. H. Maiden, the director of the Botanic Garden; also by the Premier and the Minister of Agriculture. Three vistas in the Garden were named as follows: the Capt. Cook Vista, the Sir Joseph Banks Vista and the George Phillip Vista. The rose garden was formally named the Centenary Rosary, and memorial trees were planted by representatives of the Empire and the Allies. These trees formed part of the design to create the three vistas already referred to. The foundation stone was laid for the proposed Museum of Botany and Horticulture.

The Garden Library has received the final Report of the Division of Advertising of the Committee of Public Information on their war advertising work. The second page reads as follows: "This copy is inscribed to *American Journal of Botany,* whose patriotic contribution of space or services has helped to win the war through advertising." The report contains reproductions of the posters and advertising announcements used by the Department in its advertising, combined with a list of all publications, individuals or organizations contributing advertising space.

Teaching Natural Science in Norway.—From an article by H. P. Kjerskog-Agerzborg, in *School and Society,* June 7, 1919, we learn that the natural sciences, botany, geology, zoology, chemistry, and physics, hold a much more prominent place in the primary and secondary schools of Norway than in the grammar schools and high Schools of the United States. *All* students in the primary school and in the gymnasium study natural science. Botany, introduced in the fifth year, begins with dicotyledons and includes about twenty domestic forms. Then follow about nine monocotyledons which, like the former, are studied mostly from the systematic and economic point of view. This is followed by a brief introduction to the flowerless plants: ferns, mosses, algae, and fungi. Now follows a survey of useful

plants, such as coffee, tea, cotton, sugar cane, rice, maize, orange, palms, and spices. Finally comes the topic, "The Life of Plants." This part, which deals with plant physiology, is repeated in the seventh year in connection with chemistry.

The author of the article under review considers it is "almost a crime to postpone the essentials of natural science till the child has reached the age of fifteen or thereabout; to make natural science elective in the preparatory schools is almost as bad." The new program of the primary school provides for an additional 100 hours in biology. In the middle school (connecting the primary school with the gymnasium) a thorough drill is given in classification of typical plants of Norway. About 21 forms are used, divided into nine families. "At the end of the middle school the child, now at the age of 14–15 years, is able to take any given plant and classify it, and describe its life history." For this work there is available a text-book (Sörensen's "*Botanik for Middelskolen*") which is "beautifully illustrated and contains 16 colored plates and 195 text figures." The price of this book is 49 cents.

An equal amount of zoology is given every student before he leaves middle school. In addition to principles of human anatomy, physiology and the regular course in hygiene, special instruction is given in maintenance, nutriment, hygiene in a broader sense, ventilation, heating of rooms, bacteriology, cleanliness, dress, first aid, sport, dance, endurance, bathing, care of sick, etc.

"The Norwegian educators recognize that an educated person must not be totally ignorant of such fundamentals as here referred to; that it is just as necessary to know the elements of botany and zoology, chemistry and physics, as to know the fundamentals of physiology and arithmetic; that the time for the introduction and the teaching of these sciences is when the person is young."

Cat Menace to Bird Life.—The New York State Conservation Commission, Albany, New York, has recently circulated a statement calling attention to the large extent to which our bird life is menaced by cats. Since birds feed upon insect pests and weed-seed, this matter is of much importance to those who are inter-

ested in wild and cultivated plant life. The announcement of the Conservation Commission reads as follows:

"John Burroughs is of the opinion that cats probably destroy more birds than all other animals combined. Dr. A. K. Fisher of the U. S. Biological Survey estimates that the cats of New York State destroy 3,500,000 birds annually. By far the most effective checks on insect and weed pests are birds. The U. S. Government places the value of insect and weed-seed eating birds to the farmer at $1 each per year. R. M. Langdon, Secretary of the Maywood (Ill.) Bird Club, estimating the number of acts by census figures of farms and country homes, believes that throughout the country 'the removal of the cat menace to bird life might mean a saving in food each year of $101,117,886.' The loss of food and sport in quail, grouse, pheasants and other game destoryed must be added to these figures. The cat nuisance can be remedied only by the coöperation of farmers and other harborers of cats in closely limiting the number of cats on their premises and in destroying their litters; and by the assistance of sportsmen in shooting cats found hunting afield." The New York law says: "Any person over the age of twenty-one years, who is the holder of a valid hunting and trapping license, may, and it shall be the duty of a game protector or other peace officer to, humanely destroy a cat at large found hunting or killing any bird protected by law or with a dead bird of any species protected by law in its possession; and no action for damages shall be maintained for such killing."

Coöperation in Ecological Research.—According to the *Bulletin* of the Ecological Society of America for January, 1918, the Society has appointed a "Dept. of Coöperation" in order to further coöperative research in different phases of ecological science. The purpose of the committee is (*a*) to draw up a list of problems upon which work is necessary, (*b*) to enter work on a concrete problem. The problem decided upon is "The factors limiting distribution on the mountains in the northeastern states," and it is planned to begin work on this problem during the coming field season. The members of the committee represent the three main lines of work of the Society, viz.: plant ecology, for-

estry and zoölogy. They are: for plant ecology, H. L. Shantz of the Bureau of Plant Industry, Washington, D. C., and Norman Taylor of the Brooklyn Botanic Garden; for forestry, George P. Burns of the University of Vermont, Burlington, Vt., and Barrington Moore of the American Museum of Natural History, New York; for zoölogy the members have not yet been appointed.

Memorial Fruit Trees for France.—Coöperating directly with the French Government, the New York Bird and Tree Club (Incorporated) has inaugurated a campaign for funds to replant destroyed orchards in the devastated regions of France. These will be as memorials to those who sacrificed and suffered that the ideals of civilization might not perish. When orchards of one hundred trees or more are contributed by an individual, or club, the fact will be communicated to the French authorities with the expectation of receiving and transmitting to the giver a statement of the exact location of the orchard. In this number are orchards to the memory of Sergeant Joyce Kilmer, Lieutenant Quentin Roosevelt and Lieutenant Blair Thaw, with many single trees to the memory of our crusaders whose deeds will blossom and bear fruit while men live. The Bird and Tree Club articulate with "the Secretary of Liberated Regions in France" and the funds will be expended under the supervision of the "Office of Agricultural Reconstruction" which will render a detailed statement to the club.

We learn from the *Nature-Study Review* that in order to make it possible for down-town children to cultivate larger gardens in the suburbs, and in order that none may be prevented from doing so by their inability to pay car fare, the Board of Education of Cincinnati has made $500 available for the purchase of car tickets which are to be in the hands of the garden teachers and supervisors at the gardens and to be given to children who must use the cars to reach their gardens. Two hundred and twenty-five children, who will each cultivate one-twentieth acre or more are in this group, representing fourteen schools. Tickets are issued only to children who have done satisfactory garden work for a specified period, and who have paid their own car fare at least

once a week during the first ten weeks of the gardening season. Only those may receive car tickets or harvest crops from their gardens during the second ten weeks who shall have paid by August 1 their share of the estimated expenses for the season for fertilizer, plowing, and seeds furnished, provided crops of sufficient value can be raised.

The press notice issued on May 5 by the Office of Information, U. S. Department of Agriculture, states that the main arguments of objectors to Plant Quarantine No. 37, which will greatly restrict the entry of nursery stock and other plants and seeds, beginning June 1, 1919, are that either no pests are brought in on such imported stock or that thorough inspection abroad would eliminate any undesirable insects. There is no question but that the chief exporting foreign governments have given to their nursery stock the best inspection which human skill and science can afford. Failures, says the United States Department of Agriculture, are due to the human equation and to conditions not subject to change, which make inspection and certifications insufficient safeguards. The inadequacy of such inspection since 1912, when it became operative, is shown by the findings resulting from reinspection of imported material at destination in this country. Data gathered by the United States Department of Agriculture show that there has been received from Holland 1,051 infested shipments, involving 148 kinds of insect pests; from Belgium, 1,306 infested shipments, involving 64 kinds of insects; from France, 347 infested shipments, involving 89 kinds of insects; from England, 154 infested shipments, involving 62 kinds of insects; from Japan, 291 infested shipments, involving 108 kinds of insects; from Germany, 12 infested shipments, involving 15 kinds of insect pests. Many of these intercepted insects are not known to be established anywhere in this country, and numbers of them, if established, would undoubtedly become important farm, garden, or forest pests. Typical of the insects thus imported, some of which have come in on more than 1,000 shipments, are the records in relation to gipsy and brown-tail moths. In this connection it should be remembered that the gipsy moth was twenty years in Massachusetts before it was known, and this

in the face of the fact that the infestation started in a thickly populated suburb of Boston. The establishment of these two insects in different parts of the United States would soon lead to their general spread throughout the country. What this would mean in cost and damage, and also in human suffering, can hardly be estimated. Only a portion of the New England States is now invaded by these insects, and yet the expenditure in clean-up and control work alone amounts to more than a million dollars a year by the States concerned, in addition to an aiding Federal appropriation of upward of $300,000 annually.

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ERRATA

Page 95. Add footnote, starred from the title, to read as follows:

Page 126. Add signature, C. Stuart Gager, to article ending on this page.

* Report prepared from stenographic notes and manuscript of various speakers, by Miss Louisa Bruckman and Dr. C. Stuart Gager.

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